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The E.D.A. Directorship

Qualifications for an Important Position

SINCE the announcement of the retirement of Mr. A. C. Cramb from the directorship of the British Electrical Development Association in March there has naturally been a good deal of speculation regarding his successor. It was made quite clear at the annual meeting that the Council had full powers in this matter and that the general membership would have no direct voice in the appointment of a new Director. That is as it should be; the Council having been elected by the members, should enjoy their confidence in this as in all other Association affairs.

But to retain that confidence the Council must proceed with the greatest circumspection, in the literal sense. The merits of all possible candidates, from whatever direction, must be fully examined. The ideal man for the job would, of course, possess attributes difficult or impossible to find combined in one person, but it may be of assistance to suggest to the Council some desirable qualifications.

Development—Not Reorganisation

First of all it must be clearly borne in mind that the Director's function is to *sell* electricity. It is not E.D.A.'s business to attempt to reorganise the industry and the Director should steer as clear as possible of those shoals. He must be an advocate of electricity, basing his advocacy upon a conviction that electrification is essential and possessing an intimate knowledge of the things that electricity will do and of the electrical industry itself.

His contacts should not be mainly with the public, as such, but with leaders in various walks of public life. Therefore, though he must be a competent speaker, mere oratory will not do. The contacts referred to must obviously include relationships with politicians, but it is undesirable that he should be a politician himself.

As the work will involve much travelling and will in general be quite strenuous, the Director must not be easily fatigued. He should be physically fit and have before him a prospect of many years of activity. There must be a compromise between youth and experience.

The Administrative Side

That experience should have included administrative work to enable him to appreciate what is involved in the working of an organisation such as E.D.A. and to give general guidance. But we do not think that he should be too much involved in administrative details. That side of the work is already in the hands of a capable staff who only need encouragement and understanding to enable them to cope with the enormous amount of work which will have to be undertaken after the war.

At this point it is appropriate to remark that although the general opinion seems to be that the appointment should be made from outside E.D.A., it is quite conceivable that there is somebody within the Association who would fill the position as adequately as a "stranger." This should be given due weight in the Council's deliberations.

There seems to be no necessity for haste in filling the vacancy. We would suggest about six months before the end of the war, but that would involve uncanny foresight on the Council's part. It is not desirable that the new Director should have to cool his heels at Savoy Hill until such times as electrical development can be resumed, that is, in anything from one to several years' time.

London J.E.A. Scheme

IT is natural to resent any interference with one's affairs, even though it may possibly be for the common good, and so we can understand the coldness with which the London J.E.A.'s co-ordination plan is being greeted. What is not so readily comprehensible is how representatives of the constituent bodies of the Authority reconcile the plan with the views now being expressed by a number of those bodies. Neither the companies nor the municipal authorities owning electrical undertakings (which together have a majority representation) appear to favour the proposals. The outcry should dispel any idea entertained in official quarters that this was an agreed scheme.

The Ashton Undertaking

MEMBERS of all parties represented on the Ashton-under-Lyne Council have expressed disapproval of the proposal that the local gas company should acquire the town's electricity undertaking. (See *Electrical Review*, April 30th, p. 570). While such " co-ordination " may square with the ideas of some people, from the electrical aspect there is much more to be said for the suggestion that the undertaking should be acquired by, or joined up with, the Stalybridge, Hyde, Mossley & Dukinfield Transport & Electricity Board. We say this in spite of the fact that the lengthy appellation of this body might by this means be further extended.

Immense Production

WRITING in the *Manchester Guardian* J. A. Sinclair Pooley makes the remarkable statement that the hydro-electric system of Italy is the biggest of any country in the world, with a production in 1938 of 751,000 million kWh " five times greater than all electric power produced in the United States in 1940." Reference to the latest report of the Electrical Industries Bank of Zurich shows that Mr. Pooley's figure for Italian hydro - electric output is substantially greater than the entire world production in 1938, which is estimated at 460,000 million kWh. Statistics published by the Unione Nazionale Fascista Industrie Elettriche place the 1938 output of electric power in Italy at about 15,000 million kWh and the annual report of the Servizio Idrografico Centrale gives the total production in the year 1938 as 15,380 million kWh, with 14,559 million kWh produced by hydro-electric plant (about a tenth of the American production in 1940).

" Ploughed-back " Profits

IT is generally considered by industrialists that profits which are employed for the capital purposes of a business should be treated for taxation on a different footing from those that are distributed to shareholders. The Chancellor of the Exchequer evidently appreciates that this contention has something in it for he has asked the Inland Revenue Commissioners to investigate the matter, and the kindred subject of depreciation and obsolescence allowances. In concluding the debate on the second reading of the Finance Bill last week, the Financial Secretary to the Treasury said that the Government recognised the necessity for industry to be prepared to find the necessary funds involved in the change from war to peace conditions and therefore any taxation provisions which stood in the way of this should be revised.

Public " Searchlighting "

A good deal of interest has been aroused by the suggestion made at Winchester a few months ago that searchlights might be used for public lighting after the war. While not, of course, ruling out the possibility of unconventional developments in street lighting, we pointed out at the time that there were some obvious practical flaws in the scheme. Moreover, even the apparent financial saving by using equipment no longer required for its original purpose is illusory. This point was emphasised in the B.B.C. " Brains Trust " programme last week by Lieut.-Cdr. R. T. Gould who said that the cost would be about three times the present electric lighting rates.

Public Water Supply

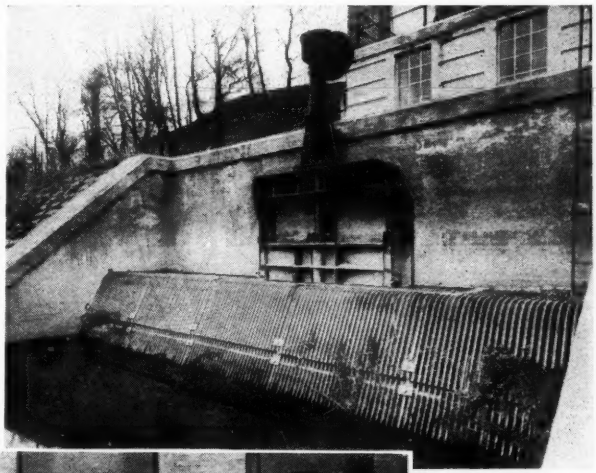
A Successful New Urban Scheme

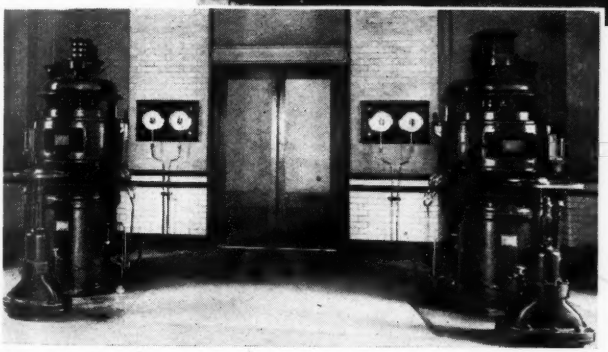
THIS article describes, from the electrical viewpoint, the layout and plant of an entirely new scheme for a town water supply which has now been working long enough to afford complete proof of its operational success.

The intake is on a fine straight reach of river, some distance from the town, and it consists of a concrete forebay 25 ft. long equipped with primary water screens. Immediately behind the primary screens the intake is controlled by a 7 ft. by 5 ft. hand-operated geared penstock at the entrance to a short culvert which conveys the incoming supply to a chamber containing duplicate sets of vertically arranged fine screens through which the water passes before it enters two concrete suction wells under the rusticated brickwork intake pump house.

The water is drawn off at a level of 2 ft. below the lowest known summer level of the river and the pump house floor is at a level of 3 ft. above the highest recorded flood level. Each well is equipped with a Harland two-stage vertical-spindle submerged turbine pump which will deliver 120,000 gallons per hour to storage reservoirs at the main works about 500 yards away with a lift of about 150 ft. Each pump is directly coupled to a 150-HP, 995-RPM three-phase "No-lag" motor which is normally remotely controlled from the main works.

The adoption of vertical pumps at the intake, although this is within suction distance of the river, was consequent on the decision to control the intake-pump motors remotely. To know that there is always a head of water on the pumps and that there is no risk of priming troubles ensures absolute confidence of the engineer at the main works. The motor starting is push-button initiated, the actual switching sequence being effected by contactors in metal and glass door cabinets near the motors in the intake house. Local starting is also provided for by means of push-buttons on the starting cabinets, while





The river intake (above) consists of a concrete forebay 25 ft. long equipped with primary water screens. The adoption of vertical pumps (left) was consequent on the decision to control the intake-pump motors remotely

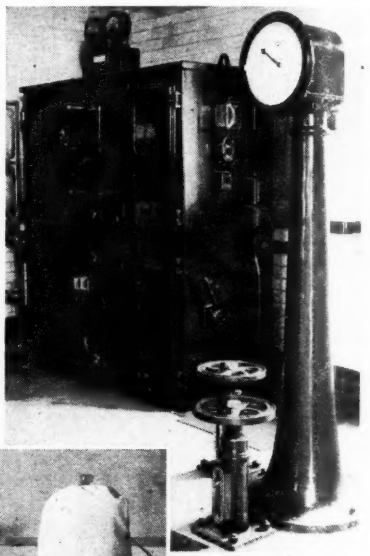
an isolator switch in the bottom of each cabinet operated by an external lever ensures safety for maintenance work. Normally the pumping is fully effected by one of the pumps, with the other one as standby.

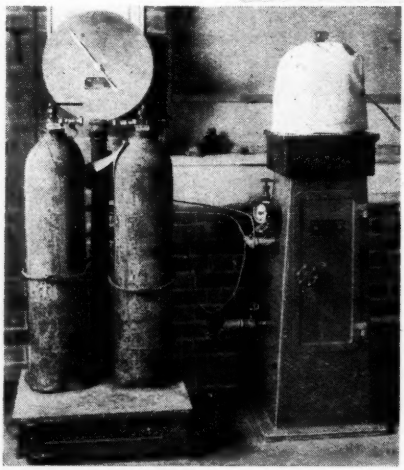
An interesting George Kent remote river-level indicating and recording scheme embraces a dual-scale float-operated visual indicator at the intake works. One scale indicates the actual ordnance datum level of the river and the other one shows the depth of the water level below the pump house floor level. The levels are transmitted electrically to the main works where they are duplicated on a similar indicating instrument and chart recorder. The transmission is effected by a battery-operated relay which is actuated in 2-in. steps of the levels, so as to send electrical impulses to the remote instruments, on the principle of automatic telephone dialling.

The water from the intake pumps is delivered by an 18-in. main to a stilling chamber at the main works, in which it wells up and spills over a Lea weir recorder at the top before actual delivery to the reservoir. This stilling equipment permits accurate registration of the water flow. There is a flow recording instrument near the weir and the flow is also remotely indicated and recorded on Kent instruments in the main works pump room by means of an electrical transmission scheme. In effect each remote instrument is a voltmeter, calibrated in gallons per hour, coupled to a resistance unit with a sliding arm which is connected to the float-arm of the weir recorder.

As the water passes from the stilling chamber to the reservoir it is both treated with alumina and chlorinated. The alumina is dissolved by filtered water in tanks situated above the stilling chamber. The dissolution of the alumina in these tanks is assisted by compressed-air agitation, the air being provided by a small motor-driven compressor specially installed for this operation. The mechanical and electrical actions in the formation of the alum floc assist the sedimentation processes in the reservoir.

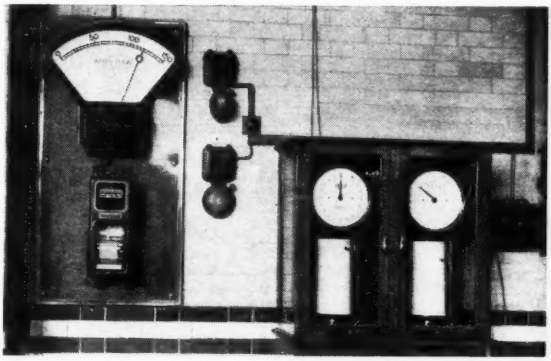
Chlorination serves for sterilisation purposes and as a preventive of algal growths within the reservoir. Liquid chlorine is stored in cylinders and the temperature of the gas must be increased as it passes into the inverted bell jar of the chlorinator to avoid liquefaction. Further, it is necessary to maintain the temperature of the apparatus at a little above 50 deg. F. to prevent the formation of "yellow ice" which would otherwise develop inside the bell jar and affect the correct working of the ball-float control valve. To meet these demands for warming a special flexible electrical heater, shaped like a tea cosy and constructed on the electric-blanket principle, fits over the bell jar. In this "Permaheat" heater, which is supplied at 230 V by an ordinary plug-and-socket connection and is loaded at 75 W, is incorporated a thermostat by means of which the temperature





Above: A remote river-level indicating and recording scheme embraces a dual-scale indicator at the intake works; note local push-button control and isolating lever on contactor cabinet at rear. Left: A special flexible electric heater fits over the bell jar of the chlorinating plant

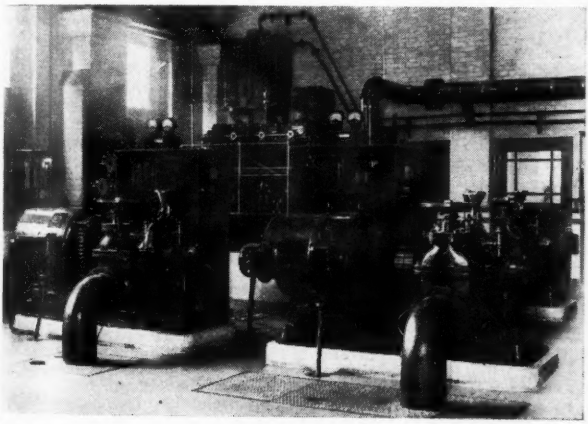
of the bell jar is automatically controlled. The treated water flows into the reservoir through a covered trough along the centre to the far end where penstocks control the direction to either or both cross troughs, through holes in the bottom of which the water escapes, thus affording uniform distribution of the water in its passage through the reservoir. This reinforced concrete reservoir is 210 ft. long and 168 ft. wide, and it has a capacity of four million gallons at the 18-ft. level. Under the central delivery trough is a mid-wall by means of which either half of the reservoir can be emptied for cleaning and maintenance purposes.



The reservoir flow (left-hand instrument) and the river and water-tower levels (right) are all electrically transmitted to the main pump room

The water leaves the reservoir at the near end through four evenly spaced floating-arm outlets and flows by gravitation into two precipitation tanks with a joint capacity of 300,000 gallons. Each tank has vertically formed baffles and serrated flooring. At the bottom of each valley on the floor is a line of perforated stoneware piping leading to an external sluice valve through which the tank is sludged out every few days into open channels leading to the sludge pits. At the end of these tanks the settled water flows over a full-width weir into channels leading to the filters. The six filters have a total filtering area of 1,680 sq. ft. and are capable of dealing with 110,000 gallons of water per hour at the rate of 65 gallons per sq. ft. per hour. They are of the open rapid gravity type with pure-sand filtering beds.

To clean the filters the water flow is reversed, and to facilitate efficient back washing the filter beds are broken up and thoroughly agitated by compressed air. This is provided by two motor-driven compressors which are fitted with mechanical overload devices to reduce the load at starting. The motors are controlled by an air-pressure switch fitted to the compressed-air receiver, switching in at 65 lb. per sq. in. and out at 77 lb. per sq. in. The compressors are housed in the main pump room. The filtered water flows into a pure-water well situated under the filter and pump houses and having a capacity of 120,000 gallons. From this well it is pumped to an elevated service water tower from which it gravitates through a 20-in. main to the town supply network.

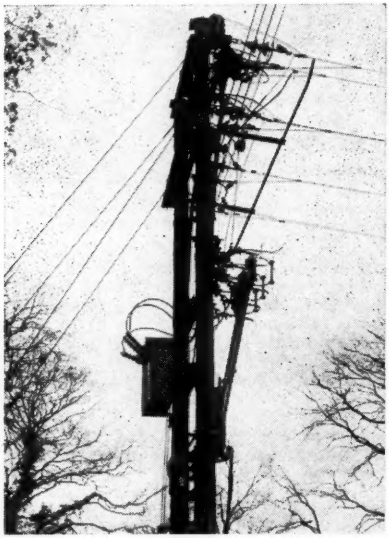


Two 92-HP motor-driven pumps deliver from the pure-water well to the water tower; Diesel stand-by set at back

For the tower feed from the pure-water well there are two centrifugal pumps of the horizontal single-impeller double-inlet type directly coupled to 92-HP "No-lag" motors. The control scheme for these is similar to that for the

pump motors at the intake house, except that in this case there is no provision for remote control. Each pump will deliver 120,000 gallons of water per hour against a total head of about 100 ft. A 100-HP Diesel-engine pumping set serves as a standby to the motor-driven pumps.

The tower is very near the pump house and it has a capacity of about 500,000 gallons. The reservoir has an internal diameter of 73 ft. and a maximum water depth of 20 ft. A mid-wall enables either



A supply to the main works is provided by a double-circuit 11-kV overhead line

half of the reservoir to be emptied for cleaning and maintenance purposes. The height from ground level to roof level is 80 ft.

The depth of the water in the tower is remotely recorded in a similar way to the recording of the river level, but in this case there is also an audible alarm system which operates at high and low levels. The two recorders are housed in the same cabinet in the main pump room.

A supply to the main works is provided by a double-circuit three-phase 0·075 sq. in. line operating at 11 kV, and the "H" terminal-pole equipment includes a pole transformer, a switch for local low-voltage distribution and the new "Metrosil" lightning arrestors. The electricity supply is transformed to 400 V in the main pump room where, in addition to the transformers, there are the high-voltage and low-voltage switchgear.

All the main electrical plant was supplied by British Thomson-Houston Co., Ltd., the "No-lag" motors contributing largely to the economic operation of the installation. The average power factor for the whole plant over a considerable test-load period was 0·98. This, coupled with the high standard of water purity and duplication and extreme cleanliness of the plant, results in a high all-round efficiency.

Light and Vision

A *Surgeon's Views*

ADDRESSING the Illuminating Engineering Society in London on May 11th Sir John Parsons, C.B.E., F.R.C.S., F.R.S., discussed the relation between illumination and visual acuity, drawing attention to the valuable work of Dr. Lythgoe and others and the development of the Illuminating Engineering Society's Code.

Turning to the colour of light Sir John expressed the view that there was no evidence that artificial sources furnishing so-called "white light" caused any harmful effects. The injurious effects of ultra-violet light in everyday life had been grossly exaggerated and the craze for "daylight" lamps had been unwarranted—though Sir John then went on to allude to the recent development of fluorescent discharge lamps which, he said, had substantial advantages. Dealing with vision at low illuminations he discussed the peculiar appearance of colours in weak light and the nature of vision at such very low illuminations as are experienced in the streets in wartime.

In reviewing the work done by the Society Sir John referred to the fact that legislation on factory lighting recommended before the last war had only become a fact during the present one. A brief reference was made to the problems awaiting the Society in connection with post-war lighting.

I.E.S. Annual Meeting

At the annual general meeting of the Society which took place prior to the address the report for the past year was summarised by the President who drew attention to the formation of new Centres at Cardiff, Newcastle and Sheffield and new Groups at Bath, Bradford, Bristol and Leicester. New members numbered 267 and the aggregate membership now exceeded 2,000 (approximately double the total before the war). About fifty meetings were being held annually and committees were engaged in the study of the I.E.S. Code, lighting conditions in special industries (textile, tailoring, iron and steel, etc.), and post-war lighting reconstruction problems.

The Society had also recently given evidence before the D.S.I.R. Committee concerned with the post-war lighting of certain types of buildings (dwellings, schools, etc.).

It was announced that the officers for the forthcoming session would be as follows:—President, Dr. H. Buckley; vice-presidents, Mr. E. Stroud, Dr. W. M. Hampton and Mr. H. C. Weston; hon. treasurer, Mr. N. V. Everton; hon. secretary, Mr. J. S. Dow.

Control Panels

Modern Practice and Suggestions for Future Developments

By J. H. M. Sykes

NOT many years ago a chief engineer, when specifying high-voltage switchgear, would pay great attention to the design details which would, in his opinion, lead to the best possible primary gear obtainable within his price limits. At the end of the specification he would add a clause which, summarised, read : " and the manufacturers are to provide a suitable control panel." In other words, it has not been until recently that any great attention has been paid to control panels as a vital link in the supply chain.

To-day every manufacturer puts forward a design which has certain definite advantages, but it is evident that much remains to be done before the state of development of the control gear will equal that of the associated primary switchgear. By combining the best features of panels constructed by principal makers, we can illustrate the best modern practice, and from there go on to consider possible developments and improvements.

In general construction, the panel is of the cubicle type, with a welded steel angle frame, sheet-steel sides, steel front, sometimes of high-gloss finish, otherwise dull black. The whole enclosure is reasonably dust-proof and entirely vermin-proof. The bus-wiring between panels is in a separate compartment, often at the top.

Doors or covers are arranged to hinge or slide, and none of these is secured with multiple bolts or screws. Wherever practicable, there is room for a man to work inside the panel. An interior light is automatically switched on by the opening of the door.

Wiring Arrangements

Regarding the wiring layout, the following is representative of modern practice :

(a) Multicore cables are not terminated inside the panel, but in a basement below.

(b) Bus-wiring is carried on copper bars in a separate compartment, with tee-offs to the individual panels.

(c) Trip circuits, fuses and links are clearly marked and segregated when possible from the rest of the wiring.

(d) Removable connection bridges, or knife switches, are provided to isolate all panel connections from external sources of supply, and from the bus-wiring.

(e) Very clear labelling shows exactly how the panel wiring is isolated, the functions of all the resistances, fuses, connections, bridges, isolating switches, and outgoing connections.

(f) A simple and easily removable form of shrouding normally covers all live terminals.

(g) Fuses and links are marked in such a way as to distinguish one from the other, and the fuses have the size of replaceable fuse wire marked on the fuse carrier. The type used is one in which every possible precaution has been taken against contact troubles in the fuse holder. The most generally used has a carrier in which the contacts are made of two separately sprung contact surfaces at each end.

(h) Wiring is cleated to the panel structure at the fewest possible points and is generally neatly whipped with cord.

(i) Asbestos-covered wire is sometimes used, but single-strand wiring is avoided. To prevent complication and to economise in length and bulk of wire, looping-in is generally avoided, and tee-off connections, sweated and properly insulated, are used. The position of these, however, must be clearly indicated on the wiring diagram. Wire size equivalent to 7/.029 is necessary for many circuits, but not for all, and 3/.029, but not smaller, is used for such circuits as indication and synchronising.

Use of Colours

(j) Coloured ferrules with the numbers clearly engraved are used to distinguish trip circuits, for instance, although too great a profusion of colours is not recommended. Similarly, coloured tails to the multicores and coloured panel wiring are used, but only where necessary for clearness. For instance, if two wires terminate on a terminal block, and one is an external connection, say to the multicore leading to the switch itself, it is an advantage to be able to distinguish that one readily. Suppose that the multicore termination box contains three incoming cables, then red, yellow and blue tails might be used for the termination of these, and black for the connections to the control panels. In the panel itself, the black wire would then denote incoming leads, and green and grey panel-interconnecting wires might be used. Systems which use separate colours for synchronising, indication, tripping, c.t. circuits, v.t. circuits, and so on, tend to become confused and defeat their own object.

(k) Terminal blocks have the number of the wire terminations clearly marked, and the terminal studs are long enough to permit of at least an extra connection, envisaging temporary alterations. No stud is less than 0 B.A. in size, if of brass, and if shrouding between terminals is used, it is not of such a size as to render the removal of the bottom

connection difficult. Wires are terminated in a type of patent terminal which has a pressed-out brass washer with claws which are subsequently bent round the wire, ensuring a strong mechanical job as well as perfect electrical contact. Ample space is allowed between terminal blocks, and above and below them, to permit of the easy withdrawal of any one wire without disturbing others.

(l) Incoming supplies, such as the main DC for tripping and closing and the AC for panel lighting, are brought in to the bus-wiring from a separate junction box, perhaps at the end of the run of panels. Difficulties arise when these are brought in, for convenience sake, in one or other of the control panels themselves.

The colouring, general layout of relays, control gear, indicating apparatus, and so on, on the face of the panel, are largely dictated by the room in which it is to be housed, the type of circuit controlled, and other factors outside the scope of these notes. Attention may, however, be drawn to the following points in the best modern practice which are not universally present.

The panel surface should be matched to its surroundings. Highly polished slate-surfaced panels are often found in dirty surroundings among rough machinery and looking entirely out of place. On the other hand, a control room often houses panels of the " exhibition" type as regards finish alongside others left with a rough industrial finish.

Indicating Lamps

Although indicating devices of the semaphore and other types are often used, the simple lamp, either in a plain coloured glass holder marked, perhaps, " Main Busbar " or " Circuit-breaker closed " or in a more modern concealed-lighting trough in a " luminous diagram " type of layout, has still much in its favour. If either a red or a green lamp must be alight on a certain circuit, the lamps themselves can never give a wrong indication. If they burn out, immediate attention is called to the failure, and replacement is simple and cheap.

Relays are so constructed that either a very clear, large and simple flag, of a type uniform to the whole switchboard, is used, or else the flags operate to a central annunciator panel with a common alarm scheme.

Labelling is provided in clear lettering at the top of the panels, but, as this is often well above eye level, it is repeated in small but very clear labels immediately alongside the control handle from which operation of the circuit is performed. There is also a label at the back of the panel, outside the door, and one inside, facing the operator when the door is opened.

Test links, in a suitable covered box, are provided on the front of the panel, enabling the protection engineers to insert the necessary instruments in the c.t. and v.t. circuits, and at the same time to observe the operation of the relays.

In considering future developments, control panels fall under two headings. The first is the " standard " type which is used in large numbers for the control of relatively small-rupturing-capacity switches. They have a great deal in common, even when used for such diverse purposes as the control of a rural 11-kV feeder and of a rectifier in an urban traction substation. The second is used for large bulk-supply circuits, where the cost of the switchgear and general terminal equipment is large compared with that of the control panel and protective gear.

Interchangeable Panels

There must be many thousands of panels by different manufacturers, controlling 6·6-kV and 11-kV feeders, transformers, converting machinery, and the like, which, though differing in detail, could really be made largely interchangeable.

If a specification calls for a 5-A tumbler switch, the manufacturer will supply one of the almost identical standard types, all having the same outside dimensions and fixing holes to one or two general sets of dimensions or types. A range of standard and interchangeable 6·6-kV and 11-kV control panels, built in sections like sectional bookcases to allow for additions for accommodating extra relays, might well become an accepted feature of all manufacturers' lists. Such a scheme would greatly facilitate system-reorganisation schemes, since the size of building, floor layout, and so on could be known in advance.

Panels might be made on the general lines followed in many schemes for building up 400-V and similar metal-clad switchboard units, with standard cable-entry units, panel frames, and steel trays for protecting wiring between multicore terminations and panels. Plastic mouldings, already used for terminal blocks, might be enlarged to incorporate such items as label frames, synchronising-plug sockets, panel door switches and wiring cleat supports. A type of finish could be developed whereby the various processes from the lowest-grade rough finish to the finest coloured and polished panel could take place one after the other on the same base, and could be stopped at the stage required by the customer. Test-link boxes could be moulded in one component with the terminal blocks for c.t. and v.t. wiring, with the required labelling integral with the moulding.

Benefits of Standardisation

Measures such as these, while requiring the courage to admit that the art has sufficiently far developed to permit of standardisation, would be of considerable benefit to manufacturer and consumer alike. It should be possible to turn out an assembly of which

75 per cent. consisted of standardised parts at a much cheaper rate than at present.

For control panels on large bulk-supply circuits an entirely opposite standpoint is suggested. With the present great diversity in the types of protective systems used and the constant research in progress, together with the constantly increasing need for perfect discrimination in ever more interconnected networks, protection engineers must be left free to modify and redesign the relays and other devices which it is the main purpose of the panel to house, and all possible testing facilities must be readily available.

Panels of this type, which are not likely to be moved, superseded, or scrapped within the depreciation lifetime of the associated primary gear, must be of ample proportions and must contain a reasonable proportion of free panel space for future additions or modifications. In addition to the general features of modern design summarised above, care must be taken to provide ample spare wiring space in all trunkings, conduits, and the like. The bus-wiring must allow for a number of spare ways, and all terminal blocks must be designed to permit of additional wiring being readily connected to every terminal, while spare terminals must be available on every block.

Although very little standardisation can be applied to individual panels of this type, care must be taken to facilitate extension work. It must be possible, for instance, to connect a new panel to the bus-wiring without major disturbance to adjacent panel wiring, or without shutting down other circuits.

Since maintenance is even more important on bulk supplies controlled by these panels, the maintenance engineer must have every facility for carrying out his work. Cleaning and dusting of the whole panel should be made easy, while contacts such as those on OCB controllers and tap-change push buttons must be readily made dead and removed.

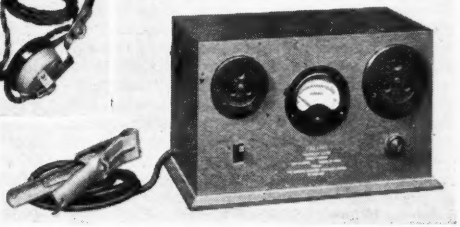
General adoption of measures such as have been indicated above would avoid some of the more frightful " hook-ups " which are to be seen up and down the country on control panels attached to major circuits, and would give those responsible for the constant maintenance and improvement of protective gear a much freer hand and save them many worries.

Cable Testing Equipment

TESTING the continuity of insulated conductors, such as the connectors of portable tools and appliances, is best done with a reasonably heavy current, so as to reveal electrically weak butt contacts. A handy instrument for the purpose is now marketed by the General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2. The equipment is self-contained and is designed for use on any 50-cycle, 200/250-V circuit.

The plug attached to the flexible connector of the appliance is inserted in the appropriate socket of the instrument, while a crocodile clip attached to a lead from the instrument is attached to the body of the appliance. If there is an open circuit in the earthing conductor, or if it is wrongly connected, the indicator lamp will glow brightly when the test key is pressed, but the ammeter will not indicate anything; fluctuation of its pointer will mean a loose or broken connection, while a high reading with a dim or extinguished pilot lamp means that the conductor under test is in good condition.

The company's Leaflet 9562 contains details of both this instrument and another for locating the position of breaks in unscreened flexible conductors, which consists of a generator of high frequency, with accessories, accommodated in a wooden carrying case. Its operation is quite simple; the ends of the cable to be tested are connected to appropriate terminals on the set and the position of the fault is ascertained with the aid of headphones attached to a search shoe drawn externally along the length of the cable.



Above : High-frequency cable-break locator
Right : Conductor continuity tester for 200/250 V

Engineers and Economics

Suggested Syllabus for Institution Examinations

WHEN lecturing to students at Faraday House in London last week Mr. T. H. Burnham (Case Development Co., Ltd.) considered it necessary to point out that there was no special sort of economics exclusively applicable to engineering. Economics was a branch of social science, concerned with motives and actions (of men engaged in making a living, or deriving income, so acquiring wealth) with a special bearing upon the results of business activities to the community. Goods and services were priced and everyone had one or the other to sell; the science of economics was directed towards elucidating the effect of the price mechanism on human behaviour.

While it was impossible to forecast the actions of individuals, it was feasible to generalise about the actions of groups of individuals of the same income level, thus forming so-called laws based on economic forces that were the background and surroundings of all industries.

A Circumscribed Meaning

Recent pronouncements by professional electrical engineers appeared to limit the term "engineering economics" to a circumscribed meaning. If it were merely required "to make financial comparisons in order to place in comparative order the degree of advantage to be derived from alternative plans," or simply to teach students to present information to financially minded people in their own language, then it seemed to the lecturer that the subject might more appropriately be entitled "engineering economy," since only the cost aspect would be considered. While engineers were rightly concerned with the ultimate economy of their projects, if the sole criterion was to be whether they would pay then one was entitled to inquire, pay whom?

There seemed to be confusion of two distinct concepts, namely, how to achieve an engineering purpose with (*a*) minimum outlay, which was desirable at all times; and (*b*) maximum monetary advantage for a given outlay by private subscribers of capital, which in some countries was considered to be anti-social in purpose. Those who must, for some time to come, conform to the second concept should remember that unless the social aspects of engineering and industrial enterprises were uppermost their study would not, by definition, be within the scope of the science of economics.

It was very necessary for an engineer to receive early grounding in the financial values of his plans and cost of his technical work, because if left to himself he tended to think only in terms of the most efficient machine. It was highly improbable that he would appreciate the time-value of money, meaning the present value of future payments and the future value of present payments. He would be able confidently to forecast the technical performance of his engineering projects, but would not realise that it was almost impossible to forecast future price levels, meaning the performance of money.

While pursuing his quest for technical efficiency an engineer must become acquainted with the overriding importance of the cost of achieving the desired results, if he was to contribute to practical decisions that had to be made in industrial affairs. By cost the lecturer meant the total in the long run; the student must understand its constituents and how they were calculated. But training which enabled men to appreciate lowest cost decisions in industrial projects was too limited. It imparted little understanding of the science of economics and its social significance, which was so requisite in men presumably destined to occupy positions of responsibility and control. Economic efficiency was not measured by the ratio of monetary output to input; business decisions did not lie between good and bad alternatives, but between two good ones, so the responsibility must be with the man who was swayed by much broader motives than maximum technical efficiency or return on invested capital.

Engineering Institutions' Requirements

In view of the consensus of opinion among leading engineering institutions that an "engineering economics" course should be an initial cultural preparation for management and administration, the lecturer submitted a rationalised and modified syllabus, though of much the same content as that of the I.E.E. examination, which could be covered in skeleton by a lecture course of about 120 hours' duration. He believed it to be highly desirable that the various institutions should have a common syllabus; this aim could be achieved through the co-ordinating influence of the Institute of Industrial Administration and the Board of Education.

The lecturer outlined his own suggestion for a preliminary first-stage syllabus in industrial organisation and control, pointing out that the contents of the lectures and the method of presentation mattered far more than the literal wording of the sub-headings of the syllabus. If necessary a second part of the examination might be set to satisfy the specialised requirements of the several institutions.

Measuring Small Quantities

Many Ingenious Electrical Instruments

AT the final meeting of the present session of the Measurements Section of the Institution of Electrical Engineers in London, Dr. E. H. Rayner gave a lecture on "Measurement of Small Quantities," remarking that few managing directors of companies recognised that measurement was the basis of industry. Therefore he proposed to wander among various physical quantities and to describe some methods and instruments evolved to meet the requirements of both science and industry.

Dr. Rayner first touched upon the measurement of fundamental quantities in common use, such as length and mass, because few people were familiar with the standards and apparatus used in making comparisons. He pointed out that the metre could be realised more accurately than the yard, while comparison of similar lengths, in terms of the wavelength of light, could be made to about 2×10^8. Mass was measurable to 1×10^8 and electrical units to 2×10^5. Comparison of weights of 1 kg. could be made to about 1 in 100×10^6. The quartz crystal oscillator had proved itself capable of providing a steadier measure of time than the best pendulum clocks.

It was of philosophic interest and technical importance that it was practicable by thermionic valves to multiply a frequency again and again, to add to it and subtract from it, and so obtain a frequency nearly equal to another frequency and measure their difference to a very high accuracy by counting the beats between them. Comparisons to something like 1 in $1{,}000 \times 10^6$ could be made, corresponding to less than a thousandth of an inch in a mile—a measurement which seemed to exceed in exactness any other in physical science.

Diamond Drilling

It was not uncommon to carry out measurements of small quantities indirectly, especially when they had to be made very frequently and with considerable accuracy. For example, measurement of the diameter of fine wires and the control of their method of production. Slides were shown of the manner in which a diamond was drilled for drawing tungsten wire with a steel drill in conjunction with diamond dust particles in suspension in oil. The particles embedded themselves in the steel when the drill was pushed into the hole in the diamond and a small proportion of them scratched away some of the diamond for a fraction of a second, when they had to be renewed by momentarily separating the diamond and the drill.

The method of measuring the size of the hole was to draw a length of wire through it. The wire was initially slightly larger than the hole. A length of 20 cm. (8 in.) was cut off and weighed. The problem then was to weigh quickly and accurately a weight of 1/100th or 1/1000th of a gramme under factory conditions, which was done by an instrument depending upon the bending of a hair spring or the torsional twist of a wire. The pointer was commonly 3 in. long and there were 500 scale divisions in the instruments having a full load range of 10 mg. or more down to 2 mg. or even 1 mg.

Reference was next made to the work that was being done at the Shirley Institute of the British Cotton Industry Research Association for quickly arriving at the weight of cotton fibres and their weight per unit length. The nature of the problem, said Dr. Rayner, would be appreciated from the fact that workers in this field had evolved a size of unit suitable for their work which was 10^{-9} gramme (a hundred millionth).

Gauging Surface Smoothness

For measuring the degree of smoothness of surfaces Dr. Tomlinson, of the N.P.L., had developed an instrument in which a stylus with a radius of about 1/10,000th in. was drawn slowly over the surface and, by a light magnifying lever motion, made a record of its vertical travel above or below the general level of the surface, on a disc of smoked glass. The magnification was about 160 times, but it could be further magnified by a projection microscope 50 or 100 times, making a total of 1,600. Messrs. Taylor, Taylor & Hobson, Ltd., of Leicester, had developed an instrument of a similar character which would record in ink the contours of surface irregularities with yariable magnification up to 40,000 times.

The same principle, with a much more robust type of mechanism, had been applied by the company to the more ordinary types of thickness and diameter measurements, having a sensitivity of 1/100,000th in. A notable application was to the control of the thickness of thin sheet passing through five rolling mills in succession without stopping. The operator had the instruments in front of him; these continuously indicated the thickness of the sheets and he could adjust the pressure of the rolls accordingly.

An interestingly simple method of measuring small changes in length had been applied to the study of magnetostriction, the change of size of iron and its alloys when magnetised, and used by Dr. Brailsford and Mr. Martin-

dale of the Metro-Vick Research Department (described to the I.E.E., in May, 1942), and Dr. Rayner pointed out the importance of the effect measured in this way on the hum of transformers.

In illustrating how the measurement of small time intervals had been facilitated by high speed photography, showing slides loaned by the Kodak Co., which included some of the external ballistics of a sneeze, Dr. Rayner said that the B.T.H. Co. had co-operated in this work by providing a special type of mercury lamp capable of providing a very intense light for a very short time when energised from a condenser of 100 mF charged to 2,000 V. Photographic studies had shown that the initial velocity of a sneeze might reach about 100 miles an hour, but it fell off to a small value in a few feet.

Among a number of lantern slides depicting high-speed photography were X-ray high-speed photographs of dirt passing through a vacuum cleaner.

Detecting Minute Currents

Small electric currents were difficult to measure directly and some indirect methods commonly used were of quite considerable technical importance. For instance, observance of loss of charge of a condenser was the basis of apparatus for measuring exposure to X-rays, which rendered the air slightly conducting by ionisation, so that if a charged condenser were carried by members of hospital staffs who were liable to be exposed to X-rays, a test of residual voltage after possible exposure would show the amount of X-ray dosage which they had received, indicating whether it had been within the safety limit or not.

The principal electrical problem had been to provide insulation between the conductors of the condenser with such a high resistance that the normal loss of charge would be negligible in many hours. This had been done successfully on a commercial scale by the Victoreen Co. of America, which had succeeded in reducing the condensers to the size of a fountain pen. Apparatus lent by the B.T.H. Co. was on exhibit, and Dr. Rayner estimated that the resistance of the insulation must be the order of 10^{18} ohms, and the leakage current 10^{-16} ampere. Reference was also made to photoelectric and other methods of measuring small currents, which had been devised by Tinsley of Cambridge, the Cambridge Instrument Co., Dr. J. R. Tilman and Dr. James.

Finally, Dr. Rayner came to what he described as the most exciting subject of his lecture which could hardly fail to have a profound effect on knowledge of biology and disease, and on the rate of progress of technical developments and improvements during the next generation in all branches of industry. This was the electron microscope. England had lagged behind America and Germany in developing this new tool, though the Metropolitan-Vickers Electrical Co. had done pioneer work on the subject as had Prof. Finch in the analogous apparatus for studying materials by means of electron diffraction.

Dr. Rayner expressed the view that no country or industry could afford to neglect to apply this new instrumental method to its daily problems, without inevitably falling behind in its rate of progress with consequential adverse effects on the standard of living and political welfare. If he were right in that point of view, it was a responsibility for the Institution of Electrical Engineers to encourage its use. The large American firm which had perfected one type of this instrument had formed a committee of eminent men in various spheres of activity to encourage its utilisation. A similar step might be taken in this country in which the I.E.E. should be represented. The Government, realising its importance, had obtained from America sets of apparatus of this type, which had been installed at the N.P.L., the Cavendish Laboratory, the Didsbury Laboratory of the Cotton Research Association, Rothamsted and at the Medical Research Institute.

Deferment of Students' Call-up

IN connection with the lowering of the call-up age and the Schedule of Reserved Occupations the secretary of the Institution of Electrical Engineers has been informed by the Ministry of Labour and National Service that new arrangements have been made in regard to deferment in the case of students who are in the third year of the Ordinary National Certificate course.

These arrangements provide that a part-time student in engineering may be recommended for deferment by the University Joint Recruiting Boards subject to all the following conditions being fulfilled, namely: (1) The student is engaged upon, or is about to start, at a recognised technical college or institution, a course of study for the Higher National Diploma or Higher National Certificate in mechanical or electrical engineering, or for a university honours degree in engineering; (2) he is judged likely to obtain such a qualification before reaching the age of 22; (3) his occupation is one in which men under the age of 25 at the date of registration are eligible to receive deferment from District Manpower Boards.

French Railway Electrification

It is announced that a further section of the Paris-Toulouse line, from Brive to Montauban, will be electrified this summer, thus completing the electrification of the whole line. Expresses between Toulouse and Paris are expected to run this year.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Council of the Institution of Electrical Engineers has nominated **Col. Sir A. Stanley Angwin**, D.S.O., M.C., T.D., as the next President. Sir Stanley is Engineer-in-Chief of the General Post Office, having succeeded Sir George Lee in that position in 1939. As staff engineer in the radio branch of the G.P.O. he played a leading part in the construction of the Leafield, Rugby and Cairo stations, and he was also associated with the beam stations erected by the Marconi Co. for the G.P.O. **Mr. T. G. N. Haldane**, M.A., a partner in Merz and McLellan, consulting engineers, and **Dr. E. B. Moullin**, M.A., Sc.D., Donald Pollock Reader in Engineering Science in the University of Oxford and a member of the senior research staff of the Metropolitan-Vickers Electrical Co., Ltd., have been nominated as vice-presidents and **Mr. E. S. Byng**, vice-chairman of Standard Telephones & Cables, Ltd., as hon. treasurer.

The nominations for ordinary members of the Council are as follows:—*Members:* **Brig. F. T. Chapman**, C.B.E., D.Sc. (Eng.), Staff Inspector of Engineering, Board of Education, at present Deputy Director of Military Training (Technical), War Office; **Mr. J. Hacking** Deputy Chief Engineer, Central Electricity Board; **Mr. A. L. Lunn**, Electrical Engineer (Generation), London Passenger Transport Board; and **Mr. J. L. Miller**, D.Eng., Ph.D., Chief Engineer, British Insulated Cables, Ltd. *Associate Members:* Mr. J. S. Forrest, M.A., B.Sc., research staff, Central Electricity Board; and **Mr. E. C. S. Megaw**, M.B.E., B.Sc., research staff of the General Electric Co., Ltd. *Companion:* **Mr. E. Leete**, a director of the London Electric Wire Co. & Smiths, Ltd., and the Liverpool Electric Cable Co., Ltd.

Mr. C. T. Melling, of Edmundsons Electricity Corporation, Ltd., has been recommended by the Luton Corporation Electricity Committee for the appointment of borough electrical engineer in succession to the late Mr. Rennie Dean.

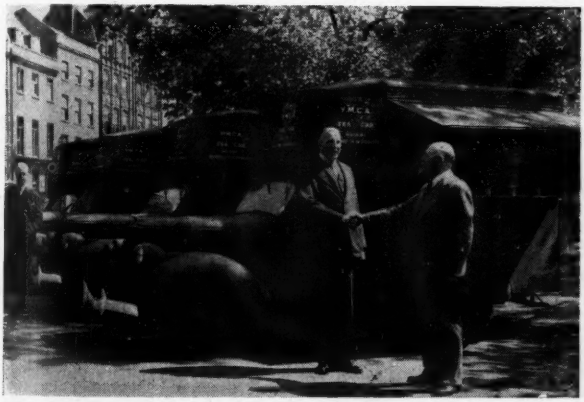
Mr. J. F. Driver, D.L.C. (Hons.), M.I.E.E., M.I.Mech.E., head of the Department of Electrical Engineering at Loughborough College, has tendered his resignation. Although he is retiring, he informs us that he will still have plenty to do. He has always done a certain amount of technical journalism and he now hopes to have opportunities for devoting more time to it.

Mr. J. F. Driver

Mr. Driver received his engineering training with the Brush Electrical Engineering Co., Ltd., passing through the workshops and later gaining experience in the electrical drawing office. Subsequently he was appointed head of the electrical department of that company on the rolling stock side of the works, where he was concerned with all branches of electric traction, including work upon the London underground railways. He was for a time with Rayworth's Traction & Patents, Ltd., where he was engaged on regenerative control, following which he went to India to take up a position with the Bombay Electric Supply & Traction Co.

On returning to this country he was appointed assistant to the chief instructor with Herbert Morris, Ltd., and from there he joined the staff of the Loughborough Technical Institute (now Loughborough College) where he has been in charge of all engineering and was responsible for equipping the laboratory and workshops. As the college expanded the Engineering Department was divided into Mechanical, Electrical and Automobile Departments, Mr. Driver retaining control of the Electrical Department and also all the works departments.

Among the developments for which he has been responsible has been the building of an instructional generating station which, since 1926, has supplied the whole of the electricity required for the college buildings and the high-



Sir Alfred Pickford (National Y.M.C.A. War Service Fund) receiving from Mr. Walter Riggs, right, the four mobile canteens presented by members of the Electrical Contractors' Association as reported in our last issue

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voltage laboratory, which is capable of generating electricity at over a million volts.

Mr. Driver is a past chairman of the East Midlands Sub-Centre of the I.E.E., a member of the Institute of British Foundrymen and a past president of the Midlands Branch. He has for many years been a member of the Higher Education Committee, National Union of Teachers, a member of the Burnham Committee and he is a past member of the Burnham Reference Committee.

The General Electric Co., Ltd., announces that **Mr. P. Ashley Cooper, Dr. C. C. Garrard** and **Mr. G. Chelioti,** have joined the board of the company.

Mr. Ashley Cooper will bring to the board of the G.E.C. the benefits of a wide business experience. He is Governor of the Hudson Bay Company, a director of the Bank of England, deputy-chairman of the Central Mining & Investment Corporation, a member of the London Passenger Transport Board, and a director of a number of other important undertakings.

Mr. P. Ashley Cooper

Dr. Garrard, Ph.D., M.I.E.E., who has long been one of the leading international authorities upon switch and control gear, received his early technical education at Finsbury Technical College. He was for some time assistant to Professor Nernst and later was with the Nernst Electric Light Co. in London. Subsequently, he became head of the Experimental Department, and manager of the Instrument and Transformer Department of Ferranti Ltd. In 1908 he was appointed manager of the switch and controller works of the General Electric Co., Ltd., Witton, of which he has ever since been in charge. In 1928 he became responsible also for the company's transformer works. In 1942 he was appointed joint general manager of the Witton group of engineering works. He has been chairman of the South Midland Centre of the I.E.E. and a member of the Council. He has served also as member of a number of the committees of the Electrical Research Association. He has read a number of papers before the I.E.E., including one on standardisation for which he received the Paris Premium. He has also contributed many articles to the Press on technical and commercial matters, and his book, "Electric Switch and Controlling Gear," is one of the standard treatises on the subject.

Dr. C. C. Garrard

Mr. Chelioti was educated at Liverpool College and after some experience in electric lamp making he joined the G.E.C. in 1912 as assistant manager of Robertson Electric Lamps, Ltd. From then until 1936, when he was made general manager of the Osram lamp and glass factories, his progress was one of steadily increasing responsibility. He acted as consultant to the M.O. Valve Co., Ltd., from its formation in 1922 and became a director last year, and is also a director of Lamp Caps, Ltd., Claude General Neon Lights, Ltd., and some other of the G.E.C. subsidiary and associated companies. He is a fellow of the Institute of Industrial Administration, member of the Works Management Association and of its Council, and a member of the Council of the Confederation of Management Associations, of which he is also vice-chairman.

Mr. C. J. B. Gregg and **Mr. B. G. W. Cole,** who for the past fifteen years have held the position of local directors of Falk, Stadelmann & Co., Ltd., at Glasgow and Manchester respectively, have been appointed to the board of the company. Mr. Gregg joined the Company in 1905 as Scottish representative, having previously had considerable experience and practical training in the various forms of lighting, heating and cooking. He has always taken an interest in municipal affairs and is an ex-magistrate of the burgh of Paisley. At present he is an officer in the 2nd Renfrewshire Battalion (Argyll & Sutherland Highlanders) Home Guard. Mr. Cole joined the Company in 1898 and after a period on the clerical side in London he subsequently held managerial positions. On the opening of the Manchester branch he was appointed manager. He is also managing director of Stoves, Ltd., of Rainhill, a subsidiary of Falk, Stadelmann, producing heating and cooking appliances.

On Thursday of last week a farewell luncheon was given at the Waldorf Hotel, Aldwych, W.C., to **Mr. A. A. Bremner, O.B.E.,** who, as we have already reported, has retired from the Directorship of the British Engineers' Association after twenty-five years' service with the Association. There were present 120 friends of Mr. Bremner, and during the luncheon Sir William Reavell, past president, presented Mr. Bremner with a cheque.

Lieut. McGeoch, in command of the lost submarine *Splendid,* is a son of Mr. L. A. McGeoch, chairman and managing director of William McGeoch & Co., Ltd., ironmongers and electrical engineers, West Campbell Street, Glasgow.

Mr. J. Cowan, H.M. Inspector of Mines, has been elected president of the Lothians branch of the Association of Mining Electrical and Mechanical Engineers.

Mr. R. G. Ramsden, area engineer, London Passenger Transport Board, has been appointed rolling stock superintendent with the Plymouth City Transport Department.

At a recent meeting of employees of W. T. Henley's Telegraph Works Co., Ltd., a presentation for long service was made to **Mr. H. T. Dixon** by Sir Montague Hughman (chairman) who handed him a framed copy of a special resolution passed by the board, together with a number of savings certificates and a personal present from himself, as well as one from Lady Hughman for Mrs. Dixon. Mr. and Mrs. Dixon are celebrating their golden wedding this year. Sir Montague also handed to Mr. Dixon an envelope containing a sum of money subscribed by his workmates. Mr. Dixon joined the company in 1893

and has been a longitudinal machine driver for forty-five years. His two brothers, also both with Henley's, have completed forty-seven and forty-five years' service respectively.

At the annual general meeting of the Birmingham Electric Club last March, the rules were altered so that in future the president and council will hold office from the commencement of the session in September. Accordingly, the Club's officers were then elected for the interim period up to the end of August. An extraordinary general meeting was held last Friday in order to elect the officers for 1943-44. **Mr. A. M. Fletcher** was nominated for the presidency, **Mr. A. T. Haywood** as senior vice-president and **Mr. M. J. Penford** as junior vice-president; and **Mr. N. M. Hill** as hon-treasurer in place of Mr. Penford.

The Illuminating Engineering Society recently arranged a social evening in the lecture hall of Magnet House, Kingsway, London, W.C.2, at which it presented a number of humorous sketches. The show was arranged in four sections, commencing with the "Initiation Ceremony into the Ancient Order of Lu Men." This was followed by a parody entitled "Brains Trussed" which included "Dr. Luminous Fluxley," "Professor Lighting Load," "Commander F. T. Candle," "Miss Milli Lambert" and "Mr. Lightup Homes." The next item on the programme was a musical pot pourri of songs old and new, wittily parodied to describe how *not* to design a domestic lighting scheme. The concluding item was a sketch, "Red Sales in the Sunset," in which a "high-power" salesman endeavoured to sell light to an unenlightened customer. Mr. R. O. Ackerley, president of the Society, introduced Dr. A. H. Railing, chairman and joint managing director of the G.E.C., who welcomed the members and friends, mentioning particularly Sir Duncan Wilson and Sir John Parsons, both past presidents.

Mr. Otto Olden, chief hydraulic engineer of the Hydro-Electric Power Commission of Ontario, was elected president of the Royal Canadian Institute at the annual meeting in Toronto.

Obituary

Mr. C. W. Broom.—We regret to announce the death at his home in Rugby on May 8th of Mr. Charles Willie Broom who had been connected with the British Thomson-Houston Co., Ltd., for more than forty years.

Mr. Broom was born in 1880 and joined the B.T.H. company at Rugby at the age of twenty-two. He specialised in arc lamp work until 1912 when he was transferred to the Meter Department, which was then commencing operations at the company's Coventry works. At the outbreak of war in 1914 this factory was turned over to the manufacture of magnetos, and since then Mr. Broom has always been a prominent member of the B.T.H. Magneto Sales Department. His work in connection with magnetos took him twice to the U.S.A. on production problems and in peace times he was a familiar figure at the motor shows and various T.T. races.

Canon E. V. F. Shaw.—The death occurred recently of Canon E. V. F. Shaw, rector of Lezant, Launceston. Before his ordination in 1909 Canon Shaw was an electrical engineer. After a period at the Plymouth Corporation electricity works he went to the London County Council and was subsequently with the Westinghouse Co. and the London Underground Railways.

Mr. J. Stone.—A *Reuter* message from San Diego (Cal.) reports the death on May 20th, at the age of seventy-four, of Mr. John Stone, a well-known electrical engineer and inventor. Mr. Stone, who was born at Dover, Virginia, had been granted over 135 U.S. patents for inventions relating to improvements in telephony and telegraphy. He was honoured by many technical societies for his work and research, and in 1923 was awarded the Medal of Honour of the Institute of Radio Engineers for distinguished service in radio communication.

Mr. F. H. Wynne.—The death occurred last Friday, at the age of sixty-five, of Mr. F. H. Wynne, who last year retired from the position of Chief Inspector of Mines.

Mr. P. S. Butchart, whose death at the age of seventy is reported in the *South African Engineer & Electrical Review*, was born and trained as an electrical engineer at Glasgow. He went to South Africa in 1903 to join the Natal Government Railways and at the time of his retirement ten years ago was chief of the electrical department of the South African railways and harbours administration at Johannesburg.

Mr. H. A. Leverrier.—The death is reported in the *Electrical Engineer and Merchandiser* of Mr. H. A. Leverrier, who for the past seven years had been with the Liverpool Electric Cable Co., Sydney, N.S.W. He was sixty years of age.

Mr. A. H. Usher.—The death has occurred at Stocksfield (Northumberland) of Mr. Alfred Harrison Usher, a member of the firm of Thomas G. Usher & Co., electrical engineers, Newcastle-on-Tyne.

Will.—Mr. C. Wilson, a director of the General Electric Co., Ltd., who died on November 12th last at the age of seventy-three, left £173,407 with net personalty of £161,656. Mr. Wilson played a large part in the development of the tungsten filament and electric-discharge lamps in this country.

The Bristol Professorship

FURTHER particulars have now been received of the professorship of electrical engineering in the University of Bristol to which brief reference was made in last week's *Electrical Review*. The annual stipend is £1,000, and it is hoped that the appointment will date from August 1st, next. The successful candidate will be responsible for the organisation of the Department and for all teaching in it; the staff of the Department consists of two full-time lecturers.

The professor will be expected to contribute to the Federated Superannuation Scheme for Universities to the extent of 5 per cent. of his salary; the University will add 10 per cent. The professor will not continue to hold office after the age of sixty-five, unless an extension is granted on special grounds. As we mentioned last week, applications must reach the Secretary and Registrar by June 1st.

British Standards

New and Amended Specifications

Electrical Glossary

A FURTHER part has now been issued of the Glossary of Terms used in Electrical Engineering (B.S. 205/1943) and the following are now available:—Part 1, general terms. Part 2, machines and transformers. Part 3, switchgear and control gear; meters and measuring instruments. Part 4, transmission and distribution. Part 5, electro-chemistry; traction. Part 6, lighting, heating and domestic appliances. The parts cost 2s. each, post free, from the British Standards Institution, 28, Victoria Street, London, S.W.1.

Fine Resistance Wire

A war emergency specification for fine resistance wire for telecommunication and similar purposes has been issued to meet the requirements of Government Departments for fine resistance wires with considerably closer tolerances than those permitted in B.S.115 (metallic resistance materials). To supply materials complying with this new specification involves special selection, and it is therefore necessary that some control shall be exercised over the material, which may be used only under licence from the Ministry of Aircraft Production. For all ordinary purposes B.S.115 will still apply. Copies of the new specification are obtainable at 6d., post free.

Electric Drilling Machines for Mines

A specification for hand-held electric drilling machines just issued covers machines such as are used in large numbers in coal mines for drilling shot holes in coal, and also in stone for blasting. When first introduced from the Continent in 1926 and for some time afterwards, the motor of such machines was controlled by making and breaking the line current directly, by means of a grip switch in the handle, but later by the application of remote control the duty of the grip switch was limited to breaking the control circuit. However, to meet the requirements of the overseas market the specification permits either direct or remote control. The machines are designed to be driven by a squirrel-cage three-phase induction motor, with a voltage limit between lines of 125 V. Copies of the specification (B.S. 1090/1943) are obtainable at 2s. post free.

Copper Sheets

A war emergency specification for hard copper sheets and strip for electrical purposes (B.S. 1110) which has just been issued, price 2s. post free, completes the series and follows the lines of the others. Requirements are laid down covering quality, freedom from defects, tolerances and mechanical tests; copper produced by the fire refined process is provided for.

Trailing Cables

Under the Quarries Regulations, individually screened cables must be constructed to the approval of the Ministry of Fuel and Power; under the Metalliferous Mines Regulations, all trailing cables must include a core for earthing associated apparatus. Both points are met in the new B.S.S. 1116/1943 (2s. post free), which deals with individually screened cables up to 660 V and pliable armoured cables up to 3,300 V. Further experimental work is needed before single-core cables with non-magnetic armouring can be added. The specification does not relate to collectively screened cables (already covered by B.S. 708), but their use is not recommended for open-cast workings or elsewhere if exposed to the weather.

Cambric-Insulated Cables

Rubber and paper being in short supply, there has been an increase in the use of varnished cambric as cable insulation. With a view to encouraging its further adoption, in so far as its probably limited availability may permit, the British Standards Institution has revised B.S. 608, the last edition of which appeared in 1935, when varnished cambric was mainly considered for installation in ships. Revisions now made bring B.S. 608/1943 into line with recent developments in manufacturing practice. It is all to the good that 660 V has been substituted for the two standards of 460 V and 1,000 V and that certain redundant types of cables and conductor sizes have been eliminated. The specification is obtainable at 2s. post free.

Welding Specifications

An important amendment has just been issued to B.S. 638, which provides for the use of an alternative cable for extension welding leads. While the t.r.s. cable is retained for short lengths of lead immediately attached to the electrode, the alternative cable, known as the semi-embedded braided type, has been developed for extension leads when flexibility is not of such primary importance as when attached to the electrode. In view of the necessity for conserving rubber it is hoped that the alternative cable will be used wherever possible. The current ratings of the cables have also been modified so as to economise in the size of cables used and alternative constructions have been included so as to increase the availability of supply. Copies of the amendment slip (PD. 97 No. 1) are obtainable from the British Standards Institution.

Heating of Cable Clamps

TEMPERATURE rise in suspension and strain clamps of magnetic material may be from 50 to 250 per cent. greater than that in the conductors they support, the *Electrical World* states. Tests at power frequency on a 0·4 sq. in. conductor loaded to 400 A showed that for the copper the rise was only 16 deg. F. above the room temperature of 86 deg., whereas for the ferrous clamps it was 48 to 54 deg. When carrying 600 and 800 A the conductors reached temperatures of 132 and 180 deg. F., as against 167 and 216 deg. for the clamps. When both the keeper piece and the U-bolt were of non-magnetic material the temperature with 600 A was 141 deg. or 9 deg. above conductor temperature. With 800 A the clamp temperature was found to be 12 deg. less than that of the conductor.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Reorganisation of Distribution

MUCH of the discussion on the above subject gives the impression that little or nothing has been accomplished up to the present. In London, however, where the situation has been the most complicated criss-cross of areas and interests a process of clarification *has* been operating and future plans must take account of past achievements and present tendencies.

In 1908 eight companies sought powers to associate, and the L.C.C. was invested with powers to purchase the companies in 1931. Management agreements between overlapping West End companies were concluded in 1910 and a technical committee of the L.C.C. reported in 1914.

The Board of Trade set up a Power Supply Committee in 1917, and the Electricity Commissioners were established in 1919. The year 1925 saw the purchasing powers of the L.C.C. transferred to the London J.E.A. and the purchase date fixed for 1971. In 1931 one of the West End companies obtained revocation of its powers, abolishing duplication over a large area.

Six of the West End companies combined in 1937, and four other companies negotiated agreements for combined, or joint, working.

The McGowan Committee reported in 1936 that: "A greater measure of amalgamation and co-ordination of both local authority and company undertakings is clearly necessary"; and further stated, "the . . . London area . . . is not a suitable one to be administered as one unit." The Government announced its adoption of the report in principle.

Another private agreement between companies in 1939 was followed by the revocation of powers of one of them, and further reduced duplication in the West End. The expiry of tenure of the London companies, in 1971, still leaves the local authority undertakings separate and distinct; and in two areas duplication of powers is yet contemplated.

In September, 1941, the powers of the Minister of Transport in connection with electricity supply were passed back to the Board of Trade. Later, the "baby" was handed to the Ministry of Fuel and Power.

The Labour Party in 1932, and Lord Reith in 1942, suggested the abolition or amalgamation of the Commissioners and the Central Board and the operation of a unified undertaking by a National Board, similar in structure to the C.E.B. It is far from certain that any such arrangement would bring advantages in the field of retail distribution, which abounds in complications of a purely local character.

The Government proposals of 1937 provided for: (*a*) the acquisition of certain undertakings by others; (*b*) the transfer of all undertakings in an area to a public board; and (*c*) centralised control of grouped undertakings by advisory boards giving decisions on all matters common to the group but leaving the identity and operation of each undertaking more or less separate.

No progress can be looked for by method (*a*) except by private treaty between companies which only cancels out certain factors of the problem and can never achieve a solution. If basis (*b*) is adopted we already have in the J.E.A. the nucleus of an appropriate Board, but the powers of the J.E.A. *must* be expanded to include control over the municipal undertakings. Method (*c*) is somewhat similar to the arrangement which exists between the County Company and its associates and may well be the nearest to practical politics.

Whatever basis eventually finds favour, regard must be paid in drawing up grouping to the recommendation of the McGowan Committee that "no variation in the settlement under the 1925 Act should be contemplated," and to other relevant factors such as existing bulk supply agreements.

EDGAR H. JESTY, A.M.I.E.E.
*London, S.E.*1.

Gas-Electric "Co-ordination"

REFERRING to the report in your current issue on the meeting of the Fuel Luncheon Club, it would be very interesting to know what the Minister of Fuel had in mind when he said "But the application of the principle of freedom of choice in remote areas might well mean an increase in prices locally." Apparently Sir David Milne Watson, president of the Club, in proposing a vote of thanks to Major Lloyd George, did not agree with the Minister when he said that "all he asked personally and for his industry was equality of opportunity for all fuel industries and freedom of choice for the consumer."

I would like to see the electrical industry support Sir David in his plea for "equality of opportunity for all fuel industries."

One way of interpreting the Minister's statement would be that in remote areas there must be a standstill order, so that if one is cooking and lighting by paraffin, gas,

or electricity, one must continue to do so for all time.

The transport of coal, paraffin or " bottled gas " has been a serious problem in many remote areas and electricity has proved in many cases to be the most efficient fuel for such areas, besides saving very costly, and in severe winters almost impossible, transport.

With regard to the intensive and sometimes wasteful competition in publicity between gas and electricity, this could be called off, but the saving per kWh sold by the Nelson undertaking would only be in the nature of 0·003d. which could hardly be passed on to the consumer. Our costs for publicity by the British Electrical Development Association pre-war were the standard rate of one-tenth of one per cent. of the revenue from the sale of electricity (excluding bulk supplies) and our local advertising was an equal amount, making a total of one-fifth of one per cent. I should think the figure of 0·003d. per kWh would be a fair average for publicity although the aggregate sum for the whole country might appear to be large.

Nelson, Lancs. J. DAWSON MARTIN,
Engineer and Manager.

Rewinding Armatures

AS a works electrician I should have been very thankful some few months back to have received the information given in Mr. R. Newing's article in your issue of April 23rd. At that time I decided to try rewinding the armatures of four portable drills.

I fail to see Mr. Ford's point regarding balance. Provided one uses the same gauge wire and number of turns as for the original job, even if the wiring was completely burned, its insulation and/or covering could be ascertained from another drill of the same type. All four drills have been in use again for some months now and are doing their job as before. If I had not attempted to rewind them I should have been cleaning lampshades or just waiting about for something to go wrong. Four rewinds in five days was a slow and tedious job but well worth while. These drills were idle for nine months on a previous occasion because the management could not get a firm to rewind them. WORKS ELECTRICIAN.

The Maintenance Engineer

SURELY the characteristic reticence of the maintenance engineer is responsible to some extent for the manner in which he is regarded by directors and works managers alike? If he is to gain recognition he must fight for it and the competent maintenance engineer will have ample evidence in support of his claims.

His responsibilities weigh heavily on him in wartime and because of these responsibilities it is now that he should endeavour to make himself heard and to refute once and for all the ridiculous and unfounded allegation that he and his department are necessary evils. Individually his effort may be likened to a voice crying in the wilderness, but let him raise his voice in unison with his colleagues and there is no doubt that the resulting cry will pierce the studied deafness of the management.

The Government too can give a lead here by including the maintenance engineer in the list of civilians honoured for their valuable services to the war effort as an appreciation of the way in which he is discharging his duties, often under trying and difficult conditions.

Welwyn Garden City. J. ALLEN,
Assoc, I.E.E.

Forthcoming Events

Institution of Electrical Engineers.—*Bristol Students' Section.*—Saturday, May 29th, 3.30 p.m. Royal Baths Lounge, Bath. Annual meeting. Films will be shown after the meeting.

Electrodepositors' Technical Society.—*Midlands Centre.*—Tuesday, June 1st, 6 p.m. James Watt Institute, Birmingham. " Questions Box."

British Institution of Radio Engineers.—*North-Eastern Section.*—Friday, June 4th, 6.30 p.m. Rutherford Technical College. Bath Lane, Newcastle-upon-Tyne. Paper: " Microphones and Receivers," by Mr. L. C. Pocock, M.Sc., A.M.I.E.E.

Incorporated Municipal Electrical Association.—Thursday, June 17th. Connaught Rooms, London, W.C.2. Annual general meeting preceded at 10 a.m. by an extraordinary general meeting.

Public Service Transport Association.—Wednesday, June 16th, 2.45 p.m. Brettenham House, Strand, W.C.2. Annual general meeting followed by an extraordinary general meeting.

Electron Diffraction

APPLICATIONS of the electron diffraction method of examining materials were the subject of the annual May Lecture of the Institute of Metals, which was delivered in London by Professor G. P. Thomson.

He commenced with an elementary account of the theory and described how the method was utilised for investigating the structure of crystalline substances, pointing out that it was specially useful for studying thin surface layers. From many possible applications the lecturer selected a few of particular interest to metallurgists for detailed discussion and illustration, including the nature of the polished layer on metals, orientation of oil molecules during boundary lubrication, both the structure and orientation of crystals deposited by sputtering or electrolysis on other crystal surfaces as well as compounds formed in the solid state by chemical action on crystalline solids.

Supervising Engineers

Three Prizewinning Papers

THE three prize-winning contributions of thirty-one entries for the Branch Papers Competition of the Association of Supervising Electrical Engineers were read by their authors at the Association's final meeting of the present session held in London on May 18th.

Electricity in Retail Stores

The retail store as a factor in the electrical industry was dealt with by Mr. A. W. Jervis (North-West London Branch), who pointed out that the eagerness of manufacturers of many kinds to share in the equipping of new stores was accounted for by the diversely numerous ways in which electricity was used on such premises. Although they were not the only purchasers who dealt in large quantities, they were more numerous than other large users; big factories had not the same density of electrification, while smaller shops lacked the scope which justified complex installations.

Direct contact with the public necessitated a high standard of maintenance because dirty lighting fittings and lift breakdowns, for instance, had a direct bearing on sales. But good maintenance meant appreciable expenditure on fresh materials, examples being £20,000 on lamps, £3,000 on fittings, £2,000 on cable, £1,000 on conduit per annum in one group of stores in this country, exclusive of the materials supplied by contractors doing alterations.

Distributive trade stores had never lacked courage in adopting new appliances; they used 100 W lamps when they cost ten shillings each and also bought large numbers of good reflectors, thus helping to bring down their initial prices. The first escalator in this country was installed in a London store and the first completely fireproof electric substation was built in a Birmingham store. They were ahead of the officially recommended density of artificial light (2·5 W per sq. ft.) and one store had a cable allowance for 32 W per sq. ft. In that particular store six million kWh a year would be consumed for all purposes on a site area of only 11,000 sq. ft., which fact gave point to the statement that out of 480 miles of streets in the area of Central London Electricity, Ltd., only eight miles could be developed completely in respect of heating and lighting. On that basis the annual consumption per mile of street might be 288 million kWh, and half a million kWh a year per store was quite a common figure, so that the small site area of stores must be taken into account for comparison with factory requirements.

Considered as a whole and contrary to reasonable expectations, in the author's opinion large stores had paid more than their appropriate share of electricity costs. He believed that load factor should be the criterion of the rate paid for energy, not the use to which it was put. Light was to a store what power was to a factory; it was used in large quantities and had become an off-peak load, now that it was not restricted to the evenings. A check in 1934 at 83 centres (large, medium and small) revealed a consumption of 39 million kWh a year at an average cost of 1·27d. per kWh with a load factor of 25·13 per cent. (in one case 50 per cent.) while a check in 1939 of a smaller number of stores showed a consumption of 13 million kWh at an average price of 1·4d. per kWh. During the same period the average price obtained by all U.K. suppliers was 1·04d. per kWh. The average revenue in 1935/36 from consumers of power ranged from 0·51d. to 0·79d. and 1·75d. from domestic users while commercial users paid 2·01d. per kWh.

The stores led the way for the benefit of others; their window displays made the public conscious of the benefits of good illumination, giving people ideas for their own homes.

Motor Starting

The custom of referring to starting torque as a percentage of the normal running torque was, in the opinion of Mr. W. Acton (Leeds Branch), responsible for attempts to correlate the two values when no true relationship existed between them. Hence motors and their control gear were wrongly applied, with consequential failure and wear and tear.

He defined and differentiated between starting, accelerating, running-up and stalling torques in relation to kinetic energy and static friction, with due regard for energy lost in generating heat which must be within the radiating capacity of the plant, so greatly influencing the starting time. Examples demonstrated the methods of calculation described.

Water Purification

The treatment of water for public supply was dealt with by Mr. C. Hill (Kent Branch), who described how sedimentation could be accelerated by chemical coagulants. When particles were in colloidal suspension they possessed positive or negative charges of electricity, which must be neutralised by the coagulant in order that the particles might so

combine as to permit filtration; the coagulants must therefore be electrolytes, capable of exchanging ions.

Sterilisation by introducing chlorine into the water involved the use of somewhat expensive apparatus. An electrical system was being developed whereby common salt in solution could be converted into sodium hypochlorite, containing chlorine in a highly oxygenated form. Ozone, produced by passing dry air between high-voltage electrodes, was an effective sterilising agent which rendered the water more palatable. In the ionic process an electric current circulated through a silver electrode. Ultra-violet light was employed for sterilising small quantities of water.

The author concluded with references to methods of softening water and iron-removing processes.

PARLIAMENTARY NEWS

By Our Special Reporter

London Tariffs

IN the House of Commons on May 18th Lieut.-Col. MacNamara asked the Minister of Fuel and Power how far the consumption of electricity in London had gone down owing to voluntary and other economies; how far tariffs had been increased to meet consequent loss of revenue; and if he would devise a means of preventing the public from being thus obliged to pay for its efforts at economy.

Mr. T. Smith said that it was not possible to assess precisely the many different factors affecting the consumption of electricity under wartime conditions and he could not therefore give a precise reply to the first two parts of the question. As regarded the last part, electricity supply undertakings had not, since June, 1941, made any increases in their charges without the approval of the Government. The only grounds on which such approval was given was when the increases were unavoidably necessary to enable the undertaking to continue its function of maintaining supplies.

Lieut.-Col. Macnamara said that Mr. Smith had used the word "unavoidably." Did he consider it was right that the public should be asked to economise in electricity while at the same time charges were put up; in other words, that they should have to pay for their own economy?

Mr. Smith said he thought that Lieut.-Col. Macnamara could take it that there had been no great increase in the charges for electricity due to economy. He would also recall that there were complaints about minimum charges being excessive when they were about 15s. a quarter. An Order was made later altering that to 25s. a year, which was certainly an advantage to small consumers.

Westminster Supply

Lieut.-Col. Macnamara asked the Parliamentary Secretary to the Ministry of Works whether he was satisfied that the Palace of Westminster was receiving its electricity supply on the most favourable terms; what applications had in the past been made for a supply on a maximum demand basis; when, and how, did these negotiations conclude.

Mr. Hicks said he was not satisfied with the terms for supply of electricity to the Palace of Westminster and attempts had been made without success at intervals over a period of years to obtain more favourable treatment. A recent application for a revision of terms was still before the supply authority.

Lieut.-Col. Macnamara asked whether, as this had been going on for many years, the Ministry would take a much firmer line with the Central London Electricity undertaking.

Sir Herbert Williams asked whether that building was not so wired that if alternating current were supplied that system would break down. Until the Office of Works rewired the building so that alternating current could be supplied the electricity company would have to have a special installation to supply the building.

Mr. Hicks told Lieut.-Col. Macnamara that they would certainly press forward with all possible vigour. In reply to Sir Herbert Williams he said that he had discussed this matter with him on previous occasions.

Mr. Thorne asked if the Government had considered the advisability of installing its own electricity plant. There was no reply.

Power Station Efficiencies

IN a recent paper read at the South African Institute of Electrical Engineers Mr. A. M. Jacobs (Electricity Supply Commission) said that a steady growth of load was characteristic of almost all the larger municipal power stations in South Africa. In many cases the demand had increased so rapidly that the sites of old power stations had become inadequate for the required generating capacity, and in every instance a most progressive spirit had been evident in the planning of the new power stations.

It was not prudent for a country so far from the centres where steam turbines, generators and other component parts were manufactured to adopt the very latest novelties of Europe and the United States, where, in case of trouble, a factory expert would be available within 24 hours. Also, the economic advantages accruing from the pursuit of the ultimate in thermal efficiency were sometimes lacking. Where, for instance, a power station could obtain relatively cheap and good coal it might be uneconomic to install critical-pressure boilers to produce steam at 900 deg. F. and to employ steam-reheat cycles. It was evident that a nice balance had to be struck between initial expenditure and operating costs. In other words, the aim of power station engineering should be the production of electricity at the lowest cost per kWh consistent with reliability.

COMMERCE and INDUSTRY

War Damage Premiums. Ashton Appointment Discussed.

Commodity Insurance

THE Board of Trade states that the premium payable under any policy issued under the Commodity Insurance Scheme will continue to be at the rate of 2s. 6d. per cent. per month during the period from June 3rd to September 2nd next. The monthly and three-monthly policies for a fixed sum and three-monthly adjustable policies previously issued will be continued.

Small traders and manufacturers and professional men are reminded by the Board of Trade that they must insure their stocks and equipment if they wish to receive compensation for loss through enemy action, etc. The insurance of stocks is compulsory if they are worth more than £1,000, but there are large numbers of establishments whose stocks run below this figure and who would receive nothing if these stocks were uninsured and were destroyed by enemy action. Under the Commodity Insurance Scheme they can cover every £100 of stock for half-a-crown a month. Claims are paid as soon as the amount is settled. The insurance of equipment such as the machinery of small manufacturers, the accessories of shops, and the professional books of professional men can be effected under the Business Scheme. Here again the limit for voluntary cover is £1,000, the cost being 5s. for every £100 for a period of six months. Losses of less than £100 are paid when they are settled, but losses above this amount will not be paid until after the war. Interest at 2½ per cent. will, however, accrue as from the date of loss. Copies of a leaflet giving full particulars of the schemes are available through local chambers of commerce.

"Chiefs'" Salaries

The letter which Derby Corporation is circulating suggesting that the scale of salaries of chief electrical engineers agreed upon by the National Joint Committee is too high, recently came before the Bexley Finance Committee. It was decided to reply that as the salary scale had been agreed upon as the result of negotiations with local authorities, Bexley would take no action.

The Ashton Vacancy

Since Mr. P. Bregazzi's appointment at St. Helens last year the position of borough electrical engineer at Ashton-under-Lyne has been vacant. For a time during negotiations with a view to the acquisition of the undertaking by the Stalybridge, Hyde, Mossley and Dukinfield Joint Transport and Electricity Board Mr. J. Harwood Lumsden, the Board's chief engineer, acted in a temporary supervisory capacity at the request of the Ashton Council. Recently it has been reported that an offer by the parent company of the Ashton Gas Co. to acquire the undertaking has been under consideration.

At its last meeting the Ashton Council discussed a proposal by the Finance and Electricity Committees to advertise the position of electrical engineer and manager, at a salary of £900 per annum. Councillor Lewis Wright, chairman of the Electricity Committee, said that the Committee had decided to lodge a protest against the excessive salary scale for electrical engineers, but it was felt that, in view of the manner in which £900 was arrived at, the question should be further considered. The minute to advertise the position was referred back.

Further reference was made to the offer of the Ashton Gas Co. Members of all the main political parties stated that they were opposed to the idea of any public undertaking being acquired by a private company. A statement will be made by the Corporation in due course.

Data on Light Alloys

The first three information bulletins of a series being prepared by the Wrought Light Alloys Development Association, Union Chambers, 63, Temple Row, Birmingham, 2, are intended for use in aircraft construction works and by their sub-contractors. They provide as much technical data as possible in a concise form.

No. 1 (ten pages) is concerned with the handling, storage and transportation of these metals, with a two-page appendix summarising a standard colour identification scheme for stores. No. 2 (26 pages with a two-page index) is a guide to the properties of these alloys; attention is particularly directed to the tabulated information although it must be pointed out that specifications used at present relate almost entirely to aircraft materials, but alloys of the same properties are likely to figure in post-war developments within the electrical industry. No. 3 (Part I, 24 pages) is concerned with heat treatment practice and the strict attention to detail it necessitates; there is a four-page bibliography of the subject. Part II to be issued in due course will deal with heat-treating equipment.

The present series of booklets is part of the service the Association endeavours to give users of aluminium alloys, the resources of its Advisory Service Bureau being freely available to anyone interested in these light metals.

Chinese Engineering Apprentices

A meeting under the auspices of the Universities China Committee in London was held last week at the China Institute, Gordon Square, W.C., at which Sir Frank Gill gave a talk on "The Chinese Engineering Apprentice and the Federation of British Industries."

The Universities China Committee was formed some years ago to develop cultural and trade relations between this country and China and when the F.B.I. commenced the scheme of training Chinese engineering apprentices in this country, the Committee gave it its active support. Sir Frank explained that scholarships were awarded by the F.B.I. under a grant made from the Boxer Indemnity Fund by the Universities China Committee. A committee was set up in China which selected students considered to have the necessary qualifications for the scholarships, and the F.B.I. arranged for the successful applicants to be placed in the works

of various manufacturers in this country. The scheme had proved a great success, Sir Frank Gill said, and reports from the manufacturers indicated that the ability of the students was well above the average. A number of the students had returned to their country and were now occupying positions of responsibility in the engineering industry in China, while others were now on the permanent staff of the concerns to which they had been apprenticed. Despite the difficulties created by the war, the scheme was still in progress and forty students were at present on their way to this country.

Saving Tin

A process by which electrolytic tinplate is produced, it is said, in only one-third of the time required by hot dipping the steel is described in the *Electrical World*. The frequency necessary depends upon the thickness of the tinplate, which is usually from 0·008 to 0·011 in., for which 200,000 cycles per sec. is found most suitable.

A rectangular inductor coil is wound close to the strip and acts as the primary of a transformer, the strip itself constituting a single-turn secondary. Power for heating is supplied by vacuum-tube oscillators fed with DC from a high-voltage rectifier plate transformer and an electronic rectifier. The oscillator output, based on a strip speed of 1,000 ft. per min., is 1,200 kW.

By this induction heating method, peaks are levelled on the sheet. Within 0·7 sec. after a 36-in. wide strip has entered the coil, the temperature is brought up to 450 deg. F. when the tin starts to flow.

Canadian Signal Equipment

The Ottawa correspondent of *The Times* reports that Canadian manufacturers have undertaken a wide expansion of their production of signal apparatus for the forces of the United Nations. Extensions of plant will enable them to raise the value of their annual production from the peacetime figure of $15 million to $250 million.

The correspondent says that all the chief electrical concerns in Canada have nearly doubled their facilities and more than 20,000 people are employed in turning out equipment for ships, tanks and guns. Elaborate research facilities have enabled Canadian manufacturers to produce special ground and air detection apparatus, and exhaustive tests are being conducted to provide radio signal equipment which will operate effectively between 50 deg. below zero and 150 deg. above and will be unaffected by altitude, moisture and the corrosive effects of sea water.

Philips' Eindhoven Works

Some interesting facts concerning the events at the time of the invasion of Holland are given in a statement by Philips Lamps (Australasia) Pty., Ltd., which is published in the *Merchandiser* (Sydney).

In commenting on the bombing of the Eindhoven works last December the company stated that the invasion of Holland did not catch Philips quite unawares. Extensive preparations had been made beforehand to transfer assets, equipment and some of the more expert members of the staff to England. When, on the day of invasion, it became apparent that Holland could not be held, a huge caravan of cars containing management, officials, files, documents and valuables made a perilous voyage to the coast where, notwithstanding heavy bombing, the main party arrived and was conveyed by British destroyer to London. The management immediately started organising activities for the Allied Nations from London, and subsequently some went to New York to look after the organisation in the Western Hemisphere.

Since then communication with the main works in Holland had been cut off, but it had been learned that a new organisation was set up which succeeded in keeping the plants going to a certain extent. During the first two years of occupation it was part of the German policy not to impose production of war material on the Dutch factories. In July last it was reported that several members of the management had been arrested and taken away as hostages, including Mr. A. Giberius, who was at one time governing director of Philips Lamps (Australasia), and that a German had been appointed as head of the concern. Since then it was apparent that the works had been organised to work for the Germans.

Following the bombing of the Eindhoven works the staff of Philips in Australia sent a cable to the aged founder of the concern, Dr. Philips, now in New York, expressing their sympathy at the destruction of his life's work and promising to go steadfastly ahead until final victory was achieved and the restoration of the works in Holland completed. A similar pledge that Eindhoven would be rebuilt was made at the time by Mr. S. S. Eriks, managing director of Philips Lamps, Ltd., on the occasion of a football match in London at which the Prime Ministers of the Netherlands and Belgium were present.

Fan Data

Most useful performance tables for axial-flow fans of various diameters and speeds at different static pressures have been compiled by the Airscrew Co., Ltd., Grosvenor Gardens House, Westminster, London, S.W.1. The figures relate to single-stage fans with 8-blade impellers, performance variations being indicated for four different blade angles, their operative characteristics being based on actual National Physical Laboratory tests. The list (F.103, series W/18) is limited to fans of from 12 to 48 in. in diameter, although they are manufactured in sizes up to 24 ft. in diameter with two, four, or more blades and they can be built in two or three stages. The blades are made of laminated hardwood in true aerofoil section, finished with aluminium cellulose or hard enamel. The squirrel-cage driving motors are totally enclosed and continuously rated, their mild-steel casings having angle-iron flanges for duct fixing.

Hotel Wiring Action

Last year Mr. Frank James, licensee of the South Western Hotel, Wimbledon, was summoned by Wimbledon Corporation for obtaining light from the power circuit. The bench took the view that there was no fraudulent intent and dismissed the summons under the Probation of Offenders Act on payment of costs. The case had a sequel at Kingston-upon-Thames county court recently when Mr. James sued the Electric Installation Co., The Broadway,

Wimbledon, claiming £31 damages for alleged negligence in the wiring of a number of electric lamps at the hotel.

For Mr. James it was stated that in 1940 he bought fittings for extra lighting and after consulting a customer, Mr. Salt, who was in the employ of the Electric Installation Co., he decided to make an alteration in the arrangement of the lights. The work was entrusted to the company and was carried out by two of their employees, Mr. Chapman and Mr. Salt. The new ornamental lights were fitted to the power and not the lighting plugs.

Mr. V. Chapman said that he carried out the work under the supervision of Mr. Salt. He alleged that Mr. James, when asked how connection was to be made for the extra lighting, said that it did not matter as he was on the "all in" tariff.

Judgment was given for the Electric Installation Co., with costs.

Scientific Film Association

The English Scientific Film Association was formed on May 15th at a meeting convened by the Scientific Films Committee of the Association of Scientific Workers. Mr. Arthur Elton, presiding, stated that the Association would be independent and self-governing. The acting secretary is Mr. M. Michaelis, 51, Fitzjohn's Avenue, London, N.W.3. The Association aims at promoting the national and international use of the scientific film in order to achieve the widest possible understanding and appreciation of scientific methods and outlook, especially in relation to social progress, and generally to promote the appreciation of science through other related media suitable for the mass-diffusion of knowledge.

Canadian Battery Makers

Canadian battery manufacturers representing over 90 per cent. of the production in the industry, at a meeting held in Toronto, formed an association to be known as "The Association of Canadian Storage Battery Manufacturers." Mr. J. E. Eells (Exide Batteries of Canada, Ltd.) was elected president.

E.A.W. Activities

Miss Caroline Haslett, director of the Electrical Association for Women, addressing the Glasgow branch of the Association, suggested that there should be teaching of electrical housecraft in Scottish schools to run concurrently with the development of the hydro-electric power scheme. It was up to women to see that their ideals of housing and replanning were put into operation in the great period of reconstruction. The meeting, over which Mrs. A. E. McColl presided, was largely attended. Among the speakers was Miss Helen Kirkpatrick, the first American woman war correspondent.

The Liverpool and District Branch of the Electrical Association for Women contributed to Liverpool's response to "Wings for Victory" by organising a "Bring and Buy and White Elephant" sale. The target was £50, but the result was £117 10s. and this the Branch gave as a gift to the Lord Mayor to assist the city's target. The sale was held in the Corporation Electricity Showrooms, through the courtesy of the city electrical engineer, Mr. P. J. Robinson, who officially opened the sale, supported by Alderman Mrs. Frank Wilson (president of the Branch), Mrs. P. J. Robinson (vice-president) and Councillor Mrs. R. L. Burns, J.P. (chairman). Later at the Town Hall Mrs. Burns and Miss R. Brown (hon. secretary) presented a cheque to the Lord Mayor and Lady Mayoress on behalf of the Branch.

Fatalities

While repairing cables at an A.A. battery site in the West Riding, George Derick Savile (21), of the Royal Corps of Signals, received a fatal electric shock. At the inquest, which was adjourned, Lieut. C. Davies said it was thought that a loose wire must have come into contact with a live wire. Deceased was a very reliable workman.

A farm labourer, Denis Holmes (18), of Bradley (Cheshire) was found dead in a field recently, having apparently come into contact with a broken electric cable while gathering sticks.

An inquest on Dorothy Amy Giggle (39), a housemaid-waitress, of Marylebone, W., who received a fatal shock from a vacuum cleaner, was adjourned for a week in order that the machine should be examined.

When an inquest was held at Birmingham last week on Mrs. Lois Irene Dawson (41), who was found dead in a bath in circumstances pointing to electric shock, medical evidence was given that she died from heart failure. It was presumed that the "live" portable electric fire found under her had been pulled into the water as she collapsed. A verdict of "death from natural causes" was returned.

Engineering Training at Liverpool

The Harrison Hughes Engineering Laboratory of Liverpool University, which was damaged in an air raid, is to be partially reinstated in order to facilitate the training work which is undertaken at the University.

Catalogues Required

Houchin, Ltd., whose business is in welding plant, etc., electrical rewinds, repairs and installations, ask for manufacturers' literature to be sent to their office at 42, Stanley Street, Liverpool, 1.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

F.F.P. plastering compound.

HAMILTON GIBBS insulated handlamp.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Paint Transfers

WE have received from TRAPINEX, LTD., 43, Commerce Road, London, N.22, samples of their filmless "Trapinex" paint transfers which, although they have been used extensively for advertising on shop windows, have only recently been applied to engineering products as labels. These transfers are a patented form using paint instead of ink, and there are various kinds. With one type, designs and lettering can be applied without background, while with another, the details are printed on a solid panel of paint which slides on to the article to be labelled after immersion in water. Either type can also be supplied printed in reverse for application by means of gold size or varnish. These transfers are now being used by various concerns to indicate parts of radio sets, types of valves, etc.

Magnetic Skimmer

An addition to the wide range of magnetic filters available from PHILIPS INDUSTRIAL (Philips Lamps, Ltd.), Century House, Shaftesbury Avenue, London, W.C.2, is a useful appliance known as a magnetic skimmer. It is designed to enable ferrous sludge to be removed with ease from settling tanks and particles that form themselves into scum floating on top of the coolant trays of machine tools.

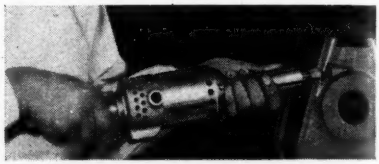
The standard model consists of two permanent magnets made of "Ticonal" 42/50 alloy enclosed in a non-ferrous tube 9 in. long and fitted with a handle. A non-ferrous sheath fits over the tube to facilitate removal of ferrous contamination. When it is in use the sheath is held in place by the operator's thumb to enable the skimmer to be dipped into the liquid so that ferrous particles are attracted to it, collecting round the outside of the sheath. Cleaning is easily done by sliding the sheath off the core, thus removing it from the magnetic field, so that metal particles adhering to it fall away. The standard model, E.7721 type, is 14 in. long overall including the handle, being 1⅞ in. in diameter and weighing 5 lb., but skimmers up to 21 in. in length can be supplied for special purposes.

Magnetic skimmer for removing floating metal from tanks

Lightweight Grinder

A handy tool, small enough to be held pencil-like in one hand, for internal and external grinding and polishing, is available from the CENTRAL TOOL & EQUIPMENT CO., LTD., Church Terrace, Richmond, Surrey.

This "Centec" machine is intended for die-sinkers, tool makers and for finishing plastic mouldings, and is made of an aluminium alloy; it weighs only 3½ lb. and is 16 in. long overall. The one-piece shaft is supported in three sets of ball bearings, the front-end set having four rows of balls; they are spring-loaded to take up wear and grease-packed to obviate oiling, the no-load speed of the spindle being 22,500 RPM. The universal 200/240-V motor is of unusual design in that its armature winding is separated from the steel shaft by a sleeve made of a material that is a good conductor of heat; it extends beyond the winding at each end where dustproof fans dissipate surplus heat.



Die-sinker's lightweight grinder and polisher

The machine casing is turned from end to end and can easily be adapted for tool-post operation by means of a clamp fitting round the central motor body, which portion is 2¾ in. in diameter and 6 in. long. The switch is built in, and variously shaped grinding wheels and polishing bobs are quickly clamped in the collet chuck by means of a key.

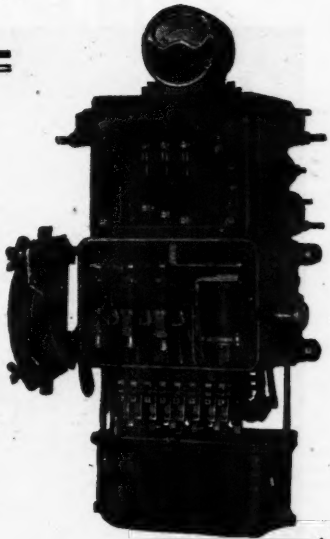
Synthetic Rubber in Sweden

ACCORDING to the *Anglo-Swedish Review*, Dr. Gösta Ehrensvärd, of the Wenner-Gren Institute in Stockholm, has succeeded in developing a kind of artificial rubber which seems to possess several good qualities. It belongs to the so-called thioplast products, the weak point of which has hitherto been that they could not be vulcanised at a high temperature. This can, however, be done with the Ehrensvärd rubber, and the unpleasant odour formerly characteristic of such products has been eliminated.

CONTROL

Immediate Despatch

Up to 50 H.P., 400/440 VOLTS



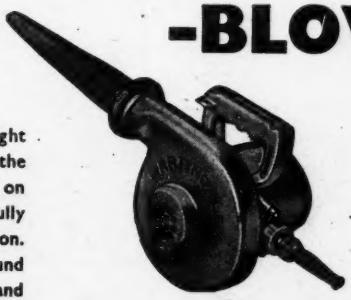
Oil Immersed Star-Delta Starter

VERITYS LTD.

ASTON, BIRMINGHAM 6

Sales Headquarters :
BRETTENHAM HOUSE, LANCASTER PLACE, W.C.2

"MARTINDALE SUPER-BLOWERS"



The most efficient lightweight portable blowers ever put on the market. Precision-built on interchangeable lines, carefully balanced to eliminate vibration. Armatures and coils hand-wound and impregnated to withstand all conditions of service all over the world.

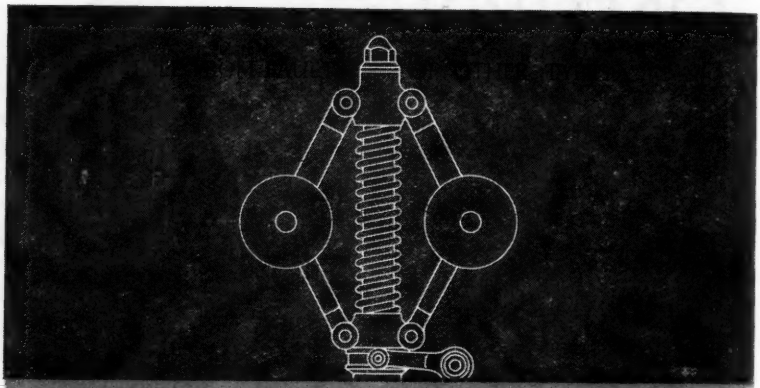
Write for literature.

Three models (1) "Mill-type" (2) Standard (3) "Blower-Clean"

All models can be instantly converted into powerful industrial vacuum cleaners.

MARTINDALE ELECTRIC CO. LTD., Westmorland Road, LONDON, N.W.9

Telephone : Colindale 8642-3 *Telegrams : Commstones, Hyde, London*



THREE

one-thousandths

In the specialised developments of to-day, there is a call for an increased standard of accuracy in practically every form of controlling instrument

So far as speed is concerned, Iso-Speedic have attained a degree of precision governing far finer than hitherto known.

With a small neat unit, simple and reliable, Iso-Speedic can control the speed of a petrol engine within plus or minus 0.3 per cent., and are constantly engaged upon the adaptation of their governors to fresh applications.

THE ISO-SPEEDIC COMPANY LTD., COVENTRY

Telephone: Coventry 5051 Telegrams: Isospeedic, Coventry

Iso-Speedic

SUPPORT THE ELECTRICAL INDUSTRIES RED CROSS FUND

ELECTRICITY SUPPLY

Dartford R.D.C. on Unification. Searchlights Again.

Fort William.—REVISION OF TARIFFS.—At its last meeting the Town Council authorised the Electricity Committee to go ahead with the preparation of new tariffs. Councillor R. H. Kean, convener of the Committee, explained that on going through the accounts he found that the burgh was losing £218 per annum in the supply to Banavie and Corpach. Also, as the result of weaknesses in the tariffs some consumers were finding loopholes and getting electricity more cheaply than they should. The Electricity Commissioners, when approached, stated that it would not be wrong to make a different charge to the Banavie and Corpach consumers, but it would be a retrograde step as it was customary to treat an electricity undertaking as a whole.

Kent.—HOSPITAL EMERGENCY LIGHTING.—The County Health Committee reports that the Ministry of Health has considered the problem of emergency lighting at hospitals and has taken steps to acquire three generating sets for conversion into portable AC generating units and to install two of them in Kent. The Committee has made arrangements for such conversion and adaptation at an estimated cost of £1,521.

Leicestershire.—DAMAGE TO SHELTERS.—A report to the County Council on damage to air-raid shelters mentions that children break up electric heaters, pull out any wires they can get hold of and damage fuse boxes if they can reach them, but often the heating elements are cleanly removed and fuse covers taken away. Even switches and lampholders have been removed with tools.

London.—FURTHER VIEWS ON J.E.A.'s PLAN.—Dartford Rural District Council has expressed its agreement with and support of the scheme of the London and Home Counties J.E.A., but considers that it requires extension to include the unification of gas undertakings in Greater London with the electricity undertakings, so as to form one public utility under local authority control. This, it is considered, would ensure large savings in distribution and the cessation of the wasteful competition between the two industries. Such savings could then be passed on to the consumer in the form of reduced charges. St. Pancras Electricity and Public Lighting Committee, which received a copy of the resolution with a request for support, does not propose to take any action.

The Electricity Sub-committee of Stoke Newington Borough Council has recommended the Council to inform the Conference of Local Authorities Owning Electricity Undertakings in Greater London that it is in agreement with public ownership in general principle. It considers, however, that the proposed terms of transfer of local authority undertakings to any new authority should be revised, and expresses disapproval of the J.E.A.'s scheme.

The Post-War Development Committee of Bexley Borough Council has authorised the town clerk to take any action necessary to oppose the reorganisation and development proposals of the Joint Electricity Authority.

Penrith.—STREET LIGHTING BY SEARCHLIGHTS.—In a report to the Urban District Council the surveyor states that post-war street lighting is a problem that must be thought of. If the present method is used in Penrith the cost of replacement will be considerable, as to replace standards and lanterns will cost not less than £700. The theory of street lighting by searchlight has endless possibilities and will have full investigation after the war. The idea is to utilise the vast number of searchlights that will be available. Winchester for one is contemplating introducing this revolutionary idea as a post-war measure.

Overseas

Australia.—PROGRESS OF PYRMONT RECONSTRUCTION.—In a review of progress during 1942 Councillor W. Neville Harding, chairman of the Sydney County Council, said that in connection with the reconstruction of the Pyrmont power station a tender for £221,294 for switchgear had been accepted and plans for the erection of a switch-house costing £120,000 had been completed. Other consequent works involving over £140,000 were being carried out. With the turbo-alternator ordered for Bunnerong power station the supply of electricity up to 1946 was assured, and the first unit at Pyrmont would by that time provide for future demands.—*Electrical Engineer and Merchandiser* (Melbourne).

VICTORIAN POWER POSITION.—Grave concern at the increase in power demand and continued delays in the manufacture of plant on order both in England and Australia is expressed by the State Electricity Commission of Victoria in its report for the year ended June 30th, 1942. At the date of the report the Commission's chief engineer for power production, Mr. E. Bate, had gone overseas with full authority from the Commonwealth Government to give effect to any measure necessary to hasten the dispatch of generating plant to Australia. The first three 30,000-kW sets to be installed as part of the ultimate development at Newport together with boiler plant, were being manufactured in England and a further 18,000-kW set had been ordered in this country. During 1941-42 the m.d. on the Commission's system was 297,696 kW, an increase of 35,876 kW over the previous year, and all plant reserved for use in case of breakdown was fully called upon. Altogether 1,331 million kWh was generated compared with 1,155 million kWh in 1940-41, an increase of 15 per cent. Average sales per consumer were 2,433 kWh; at the end of the year there were 292,341 consumers.

Eire.—SPACE-HEATING BAN.—The Electricity Supply Board announces a ban on the use of electricity for space heating. This prohibition covers the use of electric fires, heaters, radiators, tubular heaters, and all forms of space heating, direct or indirect, by electricity.

United States.—GRAND COULEE PLANT TESTED.—*Electrical West* reports that the first of the two 75,000-kW Shasta generators transferred to the Grand Coulee power house has been given a test run.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Babcock & Wilcox, Ltd., in their report and accounts for 1942, show that the net profit was £623,443, as compared with £616,021 for 1941. To this is added £105,709 brought in, making £729,152. Provision for taxation requires £370,000, and it is proposed to pay a final ordinary dividend of 6 per cent., plus a bonus of 1 per cent., maintaining the distribution for the year at 11 per cent. The balance carried forward is £107,063.

In a statement issued with the report and accounts, Lieut.-Col. Sir John Greenly says that in 1941 he warned stockholders that some reduction in the then rate of profit was to be anticipated. The factors tending in this direction were again operating during the year under review.

Glenfield & Kennedy, Ltd., report a net profit for the year ended March 31st of £63,149, as compared with £63,296 for 1941-42. Staff pension fund receives £10,000, and the final ordinary dividend is 5 per cent., again making 10 per cent., while the bonus of 10 per cent. is also repeated. The balance carried forward is £41,300 (against £37,606 brought in).

The United River Plate Telephone Co., in a statement for 1942, shows gross earnings of £4,641,771, as compared with £4,282,599 for 1941, and net earnings of £2,382,996 (against £2,223,852). After deducting depreciation and general and debenture interest there is a net income of £953,010 (against £818,240). The number of telephone stations rose from 438,511 to 461,445.

Walsall Conduits, Ltd., reports a net profit for the past year of £202,745 as compared with £189,844 in 1941. Taxation provision is £133,612 (£112,925), general reserve receives £20,000 (same) and after paying a final dividend of 35 per cent., making 55 per cent. (same) for the year £86,195 (£83,312) is carried forward.

Ransomes, Sims & Jefferies, Ltd., report a net profit for 1942 of £44,985, against £77,401 for 1941. Reserve for post-war reconstruction and contingencies receives £20,000, and the ordinary dividend for the year is maintained at 7½ per cent. The balance carried forward is £55,359 (against £54,624 brought in).

The Metropolitan Electric Cable & Construction Co., Ltd., reports a net profit for 1942 of £34,626, as compared with £37,945 for the previous year. The final ordinary dividend is 5 per cent. again making 7½ per cent., for the year, and £2,969 is carried forward (against £3,973 brought in).

The Sphere Investment Trust, Ltd., reports a net revenue of £37,258 for 1942, as compared with £36,234 for the preceding year. The ordinary dividend for the year is maintained at 5 per cent.

The Electrical Finance & Securities Co., Ltd., reports a net profit for 1942 of £62,093, as compared with £62,672 for the previous year. The final dividend is 6 per cent., plus a bonus of 2½ per cent., maintaining the distribution for the year at 12½ per cent. less tax.

The Adelaide Electric Supply Co., Ltd., has announced an unchanged interim ordinary dividend of 5 per cent.

The American Telephone & Telegraph Co., is paying the regular quarterly dividends of $2·25.

Altrincham Electric Supply Ltd., is paying a final dividend of 2½d. per 5s. share on the deferred shares (unchanged).

R. A. Lister & Co., Ltd., have declared an interim dividend of 5 per cent., as last year.

Parkinson & Cowan, Ltd., are again paying an ordinary dividend of 5 per cent. for 1942.

New Companies

Faraday & Watt, Ltd.—Private company. Registered May 8th. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, mechanical and electrical machinery tools and accessories, dynamos, motors, batteries, wireless goods, etc. Directors: H. S. Stocks, 13, Linthwaite Gardens, West Enfield, and R. Moore, 13, Georgeville Gardens, Barkingside, Essex. Registered office: 49, Queen Victoria Street, E.C.4.

K. G. & L. Industries, Ltd.—Private company. Registered May 12th. Capital, £100. Objects: To carry on the business of manufacturers of and dealers in electrical plant and accessories, scientific, musical, surgical and medical, radio, television and cinematograph instruments and apparatus, etc. Mrs. W. C. Mackenzie, 118, Emmanuel Road, S.W.12, is the first director. Registered office: 1a, Fyfield Road, S.W.9.

Burgess Mouldings, Ltd.—Private company. Registered March 6th. Capital, £5,000. Objects: To carry on the business of moulders and manufacturers of and workers in bakelite, vulcanite and plastic and other materials, manufacturers of and dealers in electrical equipment, etc. Directors: E. J. L. Cotton, Beechrome, Earl Shilton, Leics., and W. Riddell, Sketchley Hall Farm, Hinckley, Leics. Solicitor: T. Flavell, Hinckley.

D. Foote, Ltd.—Private company. Registered May 15th. Capital, £2,000. Objects: To acquire the business of electrical engineers and contractors carried on by F. Foote and A. Halstead at Bank Buildings, Manor Road, Droylsden, Lancs., as D. Foote. Directors: F. Foote, 212, Parrswood Road South, East Didsbury, Manchester, and four others. Registered office: 296, Edge Lane, Droylsden, Lancs.

Lustrac Plastics, Ltd.—Private company. Registered May 8th. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, plastics, moulding materials, chemical substances and products, plastic goods, etc. Directors: E. R. S. Holloway, 26, Crescent East, Hadley Wood, Herts, A. A.

Clark, Oak House, Morgans Road, Hertford, and G. G. Small, 15, Kings Road, Barnet, Herts. Solicitors: Cartwright, Cunningham & Co., E.C.2.

Installations Repairs, Ltd.—Private company. Registered May 6th. Capital, £100. Objects: To carry on the business of manufacturers and repairers of and dealers in dynamos, motors, armatures, magnetos, batteries, conductors, insulators, transformers, glass, pottery, rubber, insulating materials and general electrical plant, etc. Subscribers: P. F. Money and R. Moore, both of 3-4, Clements Inn, W.C.2. Solicitors: Buckeridge & Braune, 3-4, Clements Inn, W.C.2.

Sharp & Cook (Refrigeration), Ltd.—Private company. Registered May 14th. Capital, £2,000. Objects: To carry on the business of refrigerating, heating, ventilating, electrical and hydraulic engineers, hire-purchase financiers, etc. Directors: W. C. Edwards, C.A., Walnut Tree House, Clent, near Stourbridge, W. S. Sharp, 126, Ulverley Green Road, Olton, Birmingham 27 and J. R. Cook, 429, Hagley Road West, Birmingham. Registered office: 126, Ulverley Green Road, Olton, Birmingham.

Regent (1943) Arts & Plastics, Ltd.—Private company. Registered May 12th. Capital, £300. Objects: To carry on the business of manufacturers, wholesalers and retailers of, and dealers in, plastics, plastic moulds, bakelite, etc. Directors: J. Patterson, 4, Bray House, Duke of York Street, S.W.1, and A. M. Murray, 96, Regent Street, W.1. Registered office: 96, Regent Street, W.1.

Companies Struck Off the Register

The names of the following companies have been struck off the Register and they are thereby dissolved:—Arctic Fan & Electrical Co., Ltd.; Gambrell Radio Communications, Ltd.; London Radio Development Services, Ltd.

Companies' Returns

Statements of Capital

London Electrical Manufacturing Co., Ltd.—Capital, £600 in £1 shares. Return dated October 8th, 1942. 501 shares taken up. £501 paid. Mortgages and charges: Nil. A further 51 shares were allotted for cash and fully called up on March 17th, 1943.

Rubon, Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1942 (filed February 4th, 1943). Three shares issued on which "nil" has been called up. Mortgages and charges: £500.

Scott Insulated Wire Co., Ltd.—Capital, £14,000 in 4,000 preference and 10,000 ordinary shares of £1. Return dated December 31st. 2,075 preference and 10,000 ordinary shares taken up. £12,075 paid. Mortgages and charges: £5,690.

La Plata Electric Tramways Co., Ltd.—Capital, £450,000 in £1 shares (200,000 preference and 250,000 ordinary). Return dated December 31st (filed April 2nd, 1943). All shares taken up. £170,007 paid. £279,993 considered as paid. Mortgages and charges: £75,168.

Sloan Electrical Co., Ltd.—Capital, £60,000 in 10,000 preference and 50,000 ordinary shares of £1. Return dated December 21st. 8,000 preference and 40,000 ordinary shares taken up. £41,500 paid on 3,000 preference and 38,000 ordinary shares. £6,500 considered as paid on 5,000 preference and 1,500 ordinary shares. Mortgages and charges: £60,500.

Willet & Robinson, Ltd.—Capital, £13,000 in 3,000 "A" cumulative preference, 1,000 "B" cumulative preference and 9,000 ordinary shares of £1. Return dated October 30th (filed November 2nd). 3,000 preference and 3,000 ordinary shares taken up. £6,000 paid. Mortgages and charges: £8,390.

Ilco, Ltd.—Capital, £4,000 in £1 shares. Return dated November 20th. 3,901 shares taken up. £3,901 paid. Mortgages and charges: £2,513.

Lane & Ryder, Ltd.—Capital, £1,000 in £1 shares. Return dated December 30th, 1942 (filed January 13th, 1943). 1,000 shares taken up. £100 paid. £900 considered as paid. Mortgages and charges: Nil.

E. O. Walker & Co., Ltd.—Capital, £3,000 in 3,000 shares of £1 each. Return dated October 22nd, 1942 (filed January 30th, 1943). 2,025 shares taken up. £2,025 paid. Mortgages and charges: Nil.

C. A. Sothers, Ltd.—Capital, £2,500. Return dated July 2nd, 1942 (filed February 19th, 1943). 1,588 shares taken up. £1,045 paid. £543 considered as paid. Mortgages and charges: £1,200.

C. C. Pudney & Co., Ltd.—Capital, £6,000 in 6,000 shares of £1 each. Return dated February 22nd, 1943. All shares taken up. £3,560 paid. £2,440 considered as paid. Mortgages and charges: Nil.

Increase of Capital

Mawdsley's, Ltd.—The nominal capital has been increased by the addition of £25,000 in £1 ordinary shares beyond the registered capital of £75,000.

Bankruptcies

J. Cameroff, electrical engineer, carrying on business at 147, Spencer Place and 43, Camp Road, Leeds. (Matter No. 67 of 1929.) Order made April 21st suspending discharge for one day until April 22nd, 1943. (Matter No. 39 of 1935.) Order made April 21st that bankrupt pay the sum of £200 forthwith to the Official Receiver for distribution amongst the creditors in the bankruptcy, and that his discharge be suspended for one week until April 28th, 1943.

J. Lazarus and **M. Lazarus** (Langdons Radio), wireless and electrical dealers, residing at 217, Golders Green Road, Golders Green, N.W., and formerly trading at 13, Craven Park Road, Willesden, Middlesex (joint estate).—First and final dividend of 6s. 6½d. in the £1, payable any day (except Saturday) at Bankruptcy Buildings, Carey Street, London, W.C.2.

Liquidations

Mansell & Ogan, Ltd.—Meeting June 28th, at 24, Floral Street, London, W.C.2, to receive an account of the winding-up by the liquidator, Mr. J. D. H. Sheridan.

STOCKS AND SHARES

TUESDAY EVENING.

STOCK Exchange market prices are moving in switchback fashion. The fluctuations are mostly unimportant and the volume of daily business officially recorded by the markings of prices indicates noticeable contraction of activity. Surprise, and a certain degree of disappointment, continue to be expressed that the clearing out of the enemy from North Africa has not been followed by a general advance in Stock Exchange quotations and an acceleration of business. The effect of " Wings for Victory " weeks is thought to have been exaggerated as a probable explanation of the quietude shown by British Government and other gilt-edged securities. The fact remains, however, that a great deal of the money that has been going into war issues would have come into the Stock Exchange markets but for the extra national effort. When the effect of the drive has subsided the probabilities are that business in Stock Exchange markets will revive.

Post-War Theories

People are already beginning to talk of the possibility that the war may be over sooner than seemed likely a few months ago, Theory proceeds to air the view that after the cessation of hostilities there will be such a rush for capital that money rates are certain to rise, and that, as a logical sequel, stocks and shares carrying fixed rates of interest are likely to decline in value. The argument is at least debatable, but that it is not without weight can be seen by the manner in which gilt-edged stocks, including those of the Home railway prior charges, have fallen during the past fortnight.

Home Railway Stocks

After something of a dip, Home railway junior stocks started to recover, but on balance the week's changes are against holders. It is difficult to account for the fairly sharp fall other than through a little selling on behalf of previous purchasers who had bought on the hope of prices going better when North Africa had been swept clear of the enemy. No considerable amount of stock changed hands. London Passenger Transport prior charges fell a point or two: the " C " stock gave way to 61½. Southern Railway 5 per cent. preference, which was changing hands at 118 earlier this month, is now down to 112½.

Electricity Supply Accounts

Most of the electricity supply companies have been declaring the same dividends as usual and, in consequence, it is reasonable to assume that comparatively few shareholders have taken advantage of their right to inspect the annual accounts that are open to their examination. Publication of the figures relating to the year's working is not permitted, for national reasons, but where a shareholder has the curiosity, and the necessary time, to study the figures, it is open to him to exercise his privilege at the offices of the company. When matters are going smoothly, and satisfactory profits are being earned, the average shareholder is quite content to let matters take their course. It is only when dividends are reduced and earnings dwindle that he bothers to inquire into reasons and causes.

Prussian Electric

As a matter of somewhat melancholy interest, it may be mentioned that the Bank of England has lately given permission for transfers to be resumed in respect of Prussian Electric Co. 6 per cent. 25-year sterling bonds. Since the outbreak of war, a ban has been in force in connection with these bonds, and the lifting of the prohibition permits dealings to take place, subject to certain conditions. These Prussian Electric sixes were issued in November, 1928, at 93½, part of the loan being sold in England, part in Holland. The company either directly or through subsidiaries supplies electricity in a territory embracing over 15 per cent. of the total area of Germany and including many well-known towns, some of which have recently been the object of considerable attention from the R.A.F. The bonds used to be regarded as a very fair investment, and the company's shares received 6 per cent. dividend. To-day, the bonds are quoted about £4¼ per £100, and their value is conjectural.

Overseas Electrics

Palestine Electric " A " shares, after their good rise of a week ago upon the Tunisian news, gained a further 1s., advancing to 42s. 3d. On last year's dividend of 4 per cent. free of tax the present yield comes to £1 18s. per cent. net., equal to £3 16s. gross with a 10s. income tax. The dividend is expected, of course, to be increased. Jerusalem Electrics are unchanged at 26s.; East African Power remain at 32s. Calcutta Electrics at 34s.xd are about 6d. lower. Calcutta Trams have recovered to 33s. 3d. Whitehall Electric 6 per cent. preference went up 6d. to 25s. which, as things are now, would seem to represent their present worth. At 82s. 6d. Victoria Falls Power shares hold their ground: the yield at that price is no more than £3 13s. per cent. Mexican issues continue to be in favour. The prices of Mexican utilities keep very firm. Mexican Light & Power fives retain their rise to 101½.

Radio

The market for radio shares has lost a good deal of its recent vivacity, with the result that prices of the popular shares are mostly easier,

(*Continued on page* 734)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend: Previous	Dividend: Last	Middle Price May 25	Rise or Fall	Yield p.c. £	s.	d.
Home Electricity Companies							
Bournemouth and Poole	12½	12½	57/6	..	4	6	10
British Power and Light	6	7	31/–	..	4	10	4
City of London	7	7	30/–	..	4	13	4
Clyde Valley	8	8	39/–	..	4	2	0
County of London	8	8	38/6	..	4	3	2
Edmundson's:							
7% Pref.	7	7	34/–	..	4	2	4
Ord	6	6	29/–	..	4	2	9
Elec.Dis.Yorkshire	9	9	44/6	..	4	1	0
Elec. Fin. and Securities	12½	12½	51/–	..	4	18	1
Elec. Supply Corporation	10	10	46/6	..	4	6	0
Isle of Thanet	2	Nil	16/–	..		—	
Lancs. Light and Power	7½	7½	35/–	..	4	5	9
Llanelly Elec.	5½	6	26/	..	4	12	4
Lond.Assoc.Electric	4	3	22/–	+6d.	2	14	10
London Electric	6	6	26/6	..	4	10	7
London Power Red. Deb.	5	5	101½	..	4	15	7
Metropolitan E.S.	8	8	38/6	..	4	3	2
Midland Counties	8	8	38/6	..	4	3	2
Mid. Elec. Power	9	9	43/–	..	4	3	9
Newcastle Elec.	7	7	31/–	..	4	10	5
North Eastern Elec. Ordinary	7	7	32/–	..	4	7	6
7% Pref.	7	7	34/–	..	4	2	4
Northampton	10	10	47/6	..	4	4	0
Notting Hill 6% Pref. (£10)	6	Nil	9½	..		—	
Northmet Power: Ordinary	7	7	36/6	..	3	16	8
6% Pref.	6	6	31/–	..	3	17	5
Richmond Elec.	6	6	26/–	..	4	12	4
Scottish Power	8	8	37/6	..	4	5	4
Southern Areas	5	5	22/6	−6d.	4	9	0
South London	7	7	26/–	..	5	7	8
West Devon	5	5	23/–xd	..	4	7	0
West Glos.	4½	3½	23/–	..	3	0	10
Yorkshire Elec.	8	8	40/–	..	4	0	0
Overseas Electricity Companies							
Atlas Elec.	Nil	Nil	5/3	..		—	
Calcutta Elec.	7*	6*	34/–xd	−6d.	3	10	7
Cawnpore Elec.	10	10	30/–	..	6	13	4
East African Power	7	7	32/–	..	4	7	6
Jerusalem Elec.	7	5	26/–	..	3	17	0
Kalgoorlie (10/–)	7½	5	9/–	..	5	11	1
Madras Elec.	6*	4*	24/–	..		—	
Montreal Power	1½	1½	27½	..	5	7	2
PalestineElec."A"	Nil	4*	42/3	+1/–	1	18	0
Perak Hydro-elec.	6	7	9/–	..		—	
Shawinigan Power	85cts.	90cts.	19	..		—	
Tokyo Elec. 6%	6	6	19	..		—	
VictoriaFallsPower	15	15	4½	..	3	13	0
WhitehallInv.Pref.	—	—	25/–	+6d.	4	16	1

Company	Dividend: Previous	Dividend: Last	Middle Price May 25	Rise or Fall	Yield p.c. £	s.	d.
Public Boards							
Central Electricity:							
1955-60 (Civil Defence)	—	3	100	..	3	0	0
1955–75	5	5	115	..	4	7	0
1951–73	4½	4½	109	..	4	2	7
1963–93	3½	3½	103½	..	3	7	8
1974–94	3½	3½	101	..	3	3	9
LondonElec.Trans. Ltd.	2½	2½	96½	..	2	11	10
London & Home Counties 1955–75	4½	4½	111	..	4	1	1
Lond.Pass.Trans.:							
A	4½	4½	118½	−2	3	16	0
B	5	5	117½	−1	4	5	1
C	2⅞	3	61½	−1	4	17	7
WestMidlandsJ.E.A. 1948–68	5	5	110	..	4	11	0
Telegraph and Telephone							
Anglo-Am. Tel.:							
Pref.	6	6	113½	..	5	5	9
Def.	1½	1½	28	..	5	7	2
Anglo-Portuguese	8	8	24/6	..	6	10	7
Cable & Wireless:							
5½ Pref.	5½	5½	112	..	4	17	9
Ord.	4	4	80	..	5	0	0
CanadianMarconi $1	Nil	4cts.	9/9	−3d.		—	
Globe Tel. & Tel.:							
Ord.	8½*	5*	35/–	..	2	17	2
Pref.	6	6	29/3	..	4	2	3
GreatNorthernTel. (£10)	Nil	Nil	23½	+½		—	
Inter. Tel. & Tel.	Nil	Nil	18½	..		—	
Marconi-Marine	7½	7½	33/–xd	..	4	11	0
Oriental Tel. Ord.	16	10	37/–	..		—	
Telephone Props.	6	Nil	14/–	..		—	
Tele. Rentals (5/–)	10	10	11/3	..	4	9	0
Traction and Transport							
Anglo-Arg. Trans.:							
First Pref. (£5)	Nil	Nil	5/–	..		—	
4% Inc.	Nil	Nil	13	−1		—	
Brit.Elec.Traction:							
Def. Ord.	45	45	1095xd	+7½	4	2	2
Pref. Ord.	8	8	170xd	+2	4	14	2
Bristol Trams	10	10	51/–	..	3	18	6
Brazil Traction	$½	$1	31½	−1		—	
Calcutta Trams	8	5½	33/3	+2/–	3	6	2
Cape Elec. Trams	5	6	25/–	..	4	16	0
Lancs. Transport	10	10	44/3	..	4	10	4
Mexican Light 1st Bonds	5	5	101½	..	4	18	6
Rio 5% Bonds	5	5	104½	..	4	15	9
Southern Rly.:							
5% Prefd.	5	5	76	−½	6	11	6
5% Pref.	5	5	112½	−2½	4	9	0
T. Tilling	10	10	53/3	..	3	14	5
West Riding	10	10	43/–	..	4	13	0

(Continued on next page)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price May 25	Rise or Fall	Yield p.c.
Equipment and Manufacturing					£ s. d.
Aron Elec. Ord...	7½	10	41/3	+⅛	4 17 0
Assoc. Elec. :					
Ord.	10	10	50/–	..	4 0 0
Pref.	8	8	40/–	..	4 0 0
AutomaticTel.&Tel.	12½	12½	60/–	−6d.	4 3 4
Babcock & Wilcox	11	11	49/9xd	−6d.	4 8 3
British Aluminium	10	10	50/–	−6d.	4 0 0
British Insul. Ord.	20	20	5⅛	−⅛	3 14 6
British Thermostat (5/–)	18½	18½	17/6	..	5 5 9
British Vac.Cleaner (5/–)	10	15	24/3	..	3 1 10
Brush Ord. (5/–)	6	8	8/3	..	4 17 0
Burco (5/–) ..	15	15	14/3	..	5 5 1
Callender's ..	15	15	82/–	..	3 13 0
ChlorideElec.Storage	15	15	82/6	+⅛	3 12 8
Cole, E. K. (5/–)	7	10	22/–	−6d.	2 5 6
Consolidated Signal	17	24	5 9/16	..	4 6 0
Cossor, A. C. (5/–)	15	10*	21/–	−1/–	3 11 4
Crabtree (10/–) ..	17½	17½	37/6	..	4 13 4
Crompton Parkinson Ord. (5/–) ..	20	20	25/–	..	4 0 0
E.M.I. (10/–) ..	6	6	23/6	−6d.	2 11 0
Elec. Construction	10	10	44/–	..	4 11 0
Enfield Cable Ord.	12½	12½	55/–	..	4 11 0
Elecl. Switchgear (10/–)	10	10	20/–	..	5 0 0
English Electric	10	10	48/–	..	4 3 4
Ensign Lamps(5/–)	25	25	21/3	..	5 17 8
Ericsson Tel.(5/–)	22†	20†	47/6	..	2 2 2
Ever Ready (5/–)	40	40	37/6xd	−6d.	5 6 8
Falk Stadelmann	7½	7½	30/6	..	4 18 4
Ferranti Pref. ..	7	7	28/9	..	4 17 5
G.E.C.: Pref. ..	6½	6½	34/3	..	3 16 0
,, Ord. ..	17½	17½	89/–	..	3 18 8
Greenwood&Batley	15	15	39/–	+1/–	7 13 10
HallTelephone(10/–)	12½	12½	26/3	..	4 17 0
Henley's (5/–) ..	20	20	25/6	..	3 18 6
4½% Pref. ..	4½	4½	23/–	..	3 18 3
Hopkinsons ..	15	17½	63/9	+⅛	5 9 9
India Rubber Pref.	5½	5½	20/–	..	5 10 0
Intl. Combustion	30	30	6¼	..	4 17 10
Johnson & Phillips	15	15	70/–	+6d.	4 5 9
LancashireDynamo	20	22½	90/–	..	5 0 0
Laurence,Scott(5/–)	15	12½	12/–	..	5 4 2
London Elec. Wire	7½	7½	31/6	..	4 15 3
Mather & Platt	10	10	50/–	..	4 0 0
Met.Elec.CablePref.	5½	5½	21/3	..	5 3 6
Murex	20	20	5⅛	..	3 14 6
Pye Deferred (5/–)	25	25	22/6	..	5 11 1
Revo (10/–) ..	20	17½	35/6	..	4 18 7
Reyrolle	12½	12½	67/6	..	3 14 0
Siemens Ord. ..	7½	7½	31/9	..	4 14 7
Strand Elec. (5/–)	4	7½	6/6	..	5 15 5
Switchgear & Cowans (5/–) ..	10	20	15/6	..	6 9 0
T.C.C. (10/–) ..	5	5	16/3	+⅛	3 1 7
T.C. & M. ..	10	10	47/–	..	4 5 1
TelephoneMfg.(5/–)	9	9	12/–	..	3 15 0
Thorn Elec. (5/–)	20	20	21/–	..	4 15 5
Tube Investments	20	20	93/6xd	..	4 5 6
Vactric (5/–) ..	Nil	Nil	12/9	−3d.	—
Vickers (10/–) ..	10	10	20/–	..	5 0 0
WalsallConduits(4/–)	55	55	44/6	−1/–	4 18 9
Ward & Goldstone (5/–)	20	20	22/6	..	4 9 0
WestinghouseBrake	10	12½	65/–	−1/6	3 17 0
West, Allen (5/–)	7½	7½	7/6	..	5 0 0

* 5 per cent. tax-free.

† Dividends free of Income Tax.

Stocks and Shares (*Continued from page* 732)

E. K. Cole at 22s., E.M.I. at 23s., and Cossor at a guinea show falls of 6d. to 1s. Something of a speculative account had been built up in these various shares, its foundation being the rumours which were started in connection with an assumed working agreement, or the amalgamation, of the Cossor Company with Philco or another similar concern. Nothing fresh has developed to give any impetus to the speculation, and for the time being the market is listless.

Equipment and Manufacturing

Aron Electricity ordinary at 41s. 3d. show a gain of 1/16, and Hopkinsons have further risen, on the increased dividend, to 63s. 9d. Chloride Electrical Storage at 83s. 6d. have put on half-a-crown. Johnson & Phillips are a good market at 70s. Telegraph Condensers moved up 1/16 to 16s. 3d. Walsall Conduits fell 1s. to 44s. 6d., some people having looked for an increase on the previously paid dividend, now repeated, making 55 per cent. for the year. A rise of 1s. lifted Greenwood & Batley to 39s., at which price the yield, on the present rate of dividend, is £7 13s. 10d. per annum. Westinghouse Brakes are down 1s. 6d. to 65s. without this, however, having any effect upon the price of the sister Consolidated Signal shares, which rose to 5.9/16 last week, and have held their gain. British Insulated are easier at 5⅜. The general tendency of the market in this section is slightly irregular, public interest being apathetic, and business, as a natural consequence, lethargic.

Cable & Wireless

Cable & Wireless preference and ordinary stocks have failed to recover from the dullness which overtook prices last week and other issues in the telegraph-telephone market show but few changes. Canadian Marconi further receded to 9s. 9d.; Marconi Marines at 33s. are ex the dividend which made 7½ per cent. for the year. Dollar stocks in this department show no great alteration. International "Tel. & Tel." are attracting little notice, but the price keeps hard at 18½. In Wall Street, the market in American and Canadian utilities derived strength from the vigorous speech delivered by Mr. Churchill to Congress last week. Brazilian Tractions have been a subject for profit-taking and the price subsided a point to 31¾.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

AKT.-GES. Brown, Boveri & Cie.—"Gas-blast circuit-breakers." 8486/41. June 8th, 1940. (552984.) "High-voltage transformers." 8487/41. July 18th, 1940. (552985.) "Single-anode or multi-anode rectifier with vapour discharge path." 11267/41. September 23rd, 1940. (553096.)

Automatic Telephone & Electric Co., Ltd., C. R. Woodland and E. I. Houghton.—"Self-interrupted electromagnetic devices." 4670. April 8th, 1941. (553132.)

British Power Boat Co., Ltd., and F. P. Parfitt.—"Electrically operated delay-action relay devices." 13884. October 28th, 1941. (552996.)

British Thomson-Houston Co., Ltd.—"Maximum demand meters." 16761/41. January 4th, 1941. (553007.) "Methods of making a heat exchanger." 10971/42. August 14th, 1941. (553157.) "Illuminating means for an electric oven or the like." 12611/42. September 12th, 1941. (553161.)

B. N. Brooke.—"Dynamo-electric machines for the generation and utilisation of unidirectional electric current." 3121. March 10th, 1942. (553018.)

Callender's Cable & Construction Co., Ltd., and R. S. Vincent. "Manufacture of electric cables." 14322. November 6th, 1941. (553145.)

Chance Bros., Ltd., L. B. H. Hallett, and N. W. Bertenshaw.—"Float-operated electric switches." 3352. March 13th, 1942. (553090.)

A. C. Cossor, Ltd., E. E. Shelton and H. Moss.—"Cathode-ray tubes." 12050. July 23rd, 1940. (553131.)

J. A. Crabtree & Co., Ltd., H. F. McLoughlin, W. E. Hill, R. W. Morgan and T. D. G. Wintle.—Holders for electric fuses." 6415. May 12th, 1942. (553054.)

Electrical Apparatus Co., Ltd., J. N. Burke, J. R. Walton and T. H. Watts.—"Apparatus for protecting electrical apparatus against overload." 10408. July 24th, 1942. (553154.)

English Electric Co., Ltd., and P. L. Mardis.—"Temperature indicator." 12415. September 25th, 1941. (552991.)

Foster Instrument Co., Ltd., and C. E. Foster.—"Recording devices." 15233. November 26th, 1941. (553106.)

G. R. Fountain, Ltd., G. R. Fountain, A. E. C. Snell, H. J. Houlgate, E. P. Gilbert and W. J. Haines.—"Microphones." 14046. October 31st, 1941. (553030.)

E. V. C. Habgood.—"Protective systems for electricity distribution networks." 14218. November 4th, 1941. (553073.)

W. T. Henley's Telegraph Works Co., Ltd., and P. Dunsheath.—"Electric cables and joints therefor." 10780. August 23rd, 1941. (552989.)

International Business Machines Corporation.—"Electric circuit connecting device." 14293/41. October 29th, 1940. (553001.) "Teleprinter systems." 6650/41. August 17th, 1940. (553021.) "Telegraph printers." 10686/41. August 24th, 1940. (553024.)

Johnson & Phillips, Ltd., and J. Bloome.—"Electric circuit-breakers." 14822. November 18th, 1941. (553105.)

Landis & Gyr Soc. Anon.—"Arc extinction chamber for electric switches." 2833/42. April 9th, 1941. (553043.)

J. Lucas, Ltd., and J. A. Laird.—"Dynamos and regulating means therefor." 14034. October 31st, 1941. (553029.)

Marconi's Wireless Telegraph Co., Ltd.—"Methods of manufacturing alkaline earth metal beryllates." 14010/41. October 31st, 1940. (553098.)

G. D. Peters & Co., Ltd., and R. Needham.—"Electrodes or welding rods for use in automatic electric arc welding apparatus." 1233. January 29th, 1942. (553083.)

Philco Radio & Television Corporation.—"Radio receivers." 14029/41. November 16th, 1940. (553028.)

Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken).—"Electric current rectifying tubes." 1096. January 26th, 1942. (553012.) "X-ray tubes." 2065. February 16th, 1942. (553084.) "Manufacture of objects having a stratified structure." 14790. November 17th, 1941. (553104.) "Circuit arrangements for use in the transmission of ultra-high-frequency electric oscillations." 2981. March 6th, 1942. (553119.)

E. Pollard & Co., Ltd., and E. N. Hammond.—"Electric lifts." 1231. January 29th, 1942. (553013.)

A. Rakos and Technotherm, Ltd.—"Apparatus for welding or soldering metal wires, strips and the like." 14162. November 3rd, 1941. (553032.)

A. Reyrolle & Co., Ltd., and D. F. Amer.—"Electric circuit-breakers of the gas-blast type." 12449. September 25th, 1941. (553063.) "Electric circuit-breakers of the gas-blast type." 5673/43. September 25th, 1941. (Divided out of 553063.) (553092.) "Electric circuit breakers of the gas-blast type." 5674/43. September 25th, 1941. (Divided out of 553063.) (553093.)

Standard Telephones & Cables, Ltd.—"Piezo-electric crystal elements." 4160/42. December 14th, 1940. (553050.) "Piezo-electric oscillators." 4405/42. April 2nd, 1941. (553091.) "Piezo-electric crystal apparatus." 4172/42. October 19th, 1940. (553121.)

Standard Telephones & Cables, Ltd., and T. R. Scott.—"Joints for electric power cables." 14017. October 31st, 1941. (553027.)

Westinghouse Electric International Co.—"Moving stairways." 15806/41. December 7th, 1940. (553005.) "Control systems for associated dynamo-electric machines particularly applicable to rolling mill drives." 1194/42. January 29th, 1941. (553082.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—NEW SOUTH WALES.—Sydney County Council Electricity Dept. June 17th. 18,000-kVA power transformers (Spec. 673) and high-voltage testing equipment (Spec. 679; time extended) for Pyrmont power station.

June 24th. Steam generating plant, Pyrmont section B (Spec. 650).

July 8th. 50,000-kW steam turbo-alternator, Pyrmont section B (Spec. 651).

July 22nd. Reactor tie isolating equipment, Bunnerong (Spec. 632).

July 29th. 33-kV cables for duct lines (Spec. 628).

Orders Placed

Darlington.—Corporation. Accepted. Transformers (£112).—Ferranti. Overhead electric lines (£285).—F. Reid, Ferens & Co.

Douglas (Isle of Man).—Electricity Committee. Accepted. Balancer rectifier transformers.—Hewittic Electric Co.

Glasgow.—Police Committee. Accepted. Two mains power supply units for police wireless (£18 13s. each).—Stratton & Co.

Liverpool.—Electric Power and Lighting Committee. Accepted. Supply of high- and low-voltage switchgear for static substations, for the two years to June 30th, 1945.—Ferguson, Pailin; Crompton Parkinson; J. G. Statter & Co.

Swansea.—Electricity Committee. Accepted. Electrical control gear for coal-handling plant (£1,359).—Brookhirst Switchgear. Private telephone installation (£2,070).—Standard Telephones & Cables.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Bridgnorth.—Public abattoirs; I. Nicholson, borough surveyor, Town Hall.

Bromsgrove.—Extensions to dairy; R. G. Goode, dairyman, 48, Stourbridge Road.

Cheshire.—Child welfare centre, Audley; E. M. Parkes, county architect, The Castle, Chester.

Darlington.—Bakehouse, Yarm Road for A. McConachie; R. G. Oates, builder, Thomas Street, Darlington.

Alterations to Kendrew Schools (£1,590); borough engineer.

Essex.—Additions to St. Margaret's Hospital, Epping (£4,880), additions to Ayloff school (£1,076), canteen, Charlecote Road School, Dagenham (£3,158), alterations, etc., at New Hall, Boreham (£3,200) and rest centre, Waltham Hall (£500); county architect, Chelmsford.

Hale.—Additions to fire station in Ashley Road; C. P. Higginbotham, surveyor, Council Offices, Hale, Cheshire.

Hampshire.—Eight school kitchens; county architect, Winchester.

Kent.—Extensions, Leybourne Grange colony (£35,000), nurses' accommodation, County Hospital, Farnborough (£5,000), extensions to girls' technical school, Chislehurst, extensions to boys' technical school, Erith (£3,000), additions to girls' school and technical institute, Tonbridge (£5,200) and school shelters (£5,000); county architect, Maidstone.

Keswick.—Houses (20); surveyor, Urban Council Offices, Keswick, Cumberland.

Kidderminster.—Houses for R.D.C.; Pritchard, Godwin & Clist, architects, Bank Buildings.

Leicestershire.—School canteens (£1,780); county architect, Leicester.

Leyburn.—Farm workers' houses at Finghall and Arrathorne; R.D.C. surveyor.

Lichfield. — Bottle-washing premises, The Friary; Crowsnest Dairies, Ltd.

London.—Hospital improvements (£5,000); L.C.C. architect.

Loughborough.—Additions, research laboratory; Institution of Production Engineers.

Maldon.—Additions to St. Peter's Hospital (£4,476); V. G. Selwood & Co., Chelmsford.

Manchester. — Additions, transport depot, Ardwick, for Bouts-Tillotson Transports, Ltd.; A. Pickles, architect, 3, Wards End, Halifax.

Matlock.—Electric lighting and electric organ blower in church; Rev. G. Caldwell, Tansley Parish Church, near Matlock, Derbyshire.

Newcastle-on-Tyne. — Temporary school at Blakelaw; city education architect, Northumberland Road.

Newport (I.O.W.).—Fire station; N.F.S. Divisional Officer.

Richmond (Yorks).—Agricultural workers' houses at Middleton-in-Tyas, Caldwell and Aldborough St. John; F. Blenkinsopp, surveyor, R.D.C. offices.

Stockport.—Houses on the Nangreave estate, Heaviley; W. G. West, builder, 11, Great Underbank.

Stockton-on-Tees.—School kitchen at Hartburn; education architect.

Stretford.—Gas-cleansing station (£1,157); W. Lionel Gray (1933), Ltd., builders, Hospital Buildings, Farnworth, near Bolton.

Swansea.—Fire station; N.F.S., Mumbles.

Urmston.—Houses (31) at Overdale Crescent and Marlboro' Road for U.D.C.; E. L. Leeming, surveyor, Council Offices, Crofts Bank Road.

Warrington. — Wellhouse and pumping station; Peter Walker & Son, Warrington & Burton, Ltd., brewers, Dallam Brewery.

Office, Slutcher's Lane; Thames Board Mills, Ltd., box boards, Arpley Meadows.